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S. E. ROCKFORD
SF/TECH

Illinois Environmental
Protection Agency

Southeast Rockford Source Control Operable Unit
Risk Assessment Report

Final
April 11, 2000

RECEIVED
APR 12 2000

Report

**United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604**

April 20, 2000

Mr. Gerald E. Willman
Illinois Environmental Protection Agency
National Priorities List Unit
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

Re: Southeast Rockford Groundwater Contamination - OU #3
Final Risk Assessment Report

Dear Mr. Willman:

Thank you for sending along the two copies of the Final Risk Assessment report for the source control operable unit portion of site activity at Southeast Rockford. In looking back at the comments that the U.S. EPA had concerning the draft document from last summer, I see that the main comments concerned:

- further distinguishing between background and site related chemicals
- how the TACO process focuses on chemicals that pose risk
- examining a possible agricultural scenario for Area 7
- examining "hot spot" issues

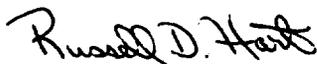
While I would like to note some of the specific changes in the final report in a bit more detail, I believe that basically the final report has added explanation and provided clarification such that U.S. EPA's previous comments have been satisfactorily addressed. In particular I note that:

- The listing of Figures has been greatly expanded, with newly added material concentrating on the assessment process, background soil sample locations, and "hot spot" delineation. I think this is a big help in overall report understanding.
- The additional language at the end of paragraph 1 on page 1-1 gives the reader a better understanding of how the Tier process can be used to establish remediation objectives.
- Figures 1 and 2 give a good presentation of the "logic flow" in the Tier 1 and 3 assessment process.

- Page 2-1 indicates that a third exposure pathway - ingestion of vegetables - has been added for examination. This addresses one of the comments noted above.
- The final sentence added on page 2-2 illustrates that when the soil remediation objectives are attained that risk will have been brought within acceptable range.
- Text added on page 3-12 and the figures that follow add useful information concerning where/how background soil conditions were derived.
- While the four exclusion criteria on page 3-17 are the same, the text has been reworded and gives a clearer understanding of exclusion criteria application.
- The footnotes added to Table 16 provide clearer term definition.
- Section 4.2 adds the vegetable ingestion pathway. Although it turns out this pathway does not pose an unacceptable risk, it was useful to explore this given the crop usage of a portion of Area 7.
- There are two points, on pages 3-25 and 4-10, where reference is made to "one in a hundred thousand" where possibly one in ten thousand is intended. On page 3-25, U.S. EPA's upper limit acceptable carcinogenic risk range is 10^{-4} , or one in ten thousand. On page 4-10, the text notes "...must be less than one in *one hundred* thousand ($1.0E-04$)..." Shouldn't that be "in ten thousand"?
- Finally, on page 5-1, the added text better explains how the feasibility study is crafted to try to attain the values established by the Tier 1/3 approach.

Thanks for letting us review.

Yours truly,



Russell D. Hart, RPM
RRB #2 - Section #5

(14) Wed. 5 - Fri. 3pm. want to study from Feb 8th -
 Wed. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276

THOMAS V. SKINNER, DIRECTOR

(217) 524-6365

April 12, 2000

Mr. Russell Hart
Remedial Project Manager
U.S. Environmental Protection Agency
77 West Jackson Blvd., SR-6J
Chicago, Illinois 60604-3590

Re: L2010300074 Winnebago Co.
Southeast Rockford Groundwater Contamination
Final Risk Assessment Report
Superfund/Technical Reports

Dear Mr. Hart:

Please find enclosed two copies of the Final Risk Assessment Report for the Southeast Rockford Groundwater Contamination Site, source control operable unit (OU3). This final report evaluates human health risks and addresses the United States Environmental Protection Agency's (U.S. EPA's) June 28, 1999 comments. Please ensure that U.S. EPA's June 28, 1999 comments were adequately addressed

As you are aware, Illinois Environmental Protection Agency (Illinois EPA) and U.S. EPA are working toward completion of a draft proposed plan for this site in early June. In consideration of the schedule, please provide any U.S. EPA response by May 5, 2000.

If you have any questions, please contact me.

Sincerely,

A handwritten signature in cursive script that reads "Gerald E. Willman".

Gerald E. Willman
Remedial Project Manager
National Priorities List Unit
Division of Remediation Management
Bureau of Land

Attachments

cc: Bureau File (w/o attach.)
Snehal Bhagat, CDM (w/o attach.)

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new table

Executive Summary

A risk assessment was conducted on the Southeast Rockford Source Control Operable Unit (SCOU) study area. The study area contains four separate source areas - Areas 4, 7, 9/10, and 11. A risk assessment was conducted in order to develop soil remediation objectives for each of these four source areas. The risk assessment followed a tiered approach, in conformance with Tiered Approach to Corrective Action Objectives (TACO): 35 ILL.ADM.CODE PART 742. TACO is a set of State of Illinois regulations that specify methods for developing remediation objectives and identifying chemicals of concern. TACO also provides guidance on associated issues such as the statistical evaluation of data, the collection and use of background data, and the establishment of compliance points.

TACO uses a three-tiered approach to identify chemicals of concern and develop remediation objectives for those chemicals. TACO's first tier (Tier 1) is a set of tables listing pre-established screening values. These screening values can be used as soil remediation objectives, or, for those chemicals with concentrations higher than the screening values, site-specific soil remediation objectives can be calculated using the methods and procedures described in Tier 2 or Tier 3. A combination of Tier 1 and 3 was used in this risk assessment. The soil remediation objectives and conclusions reached in this risk assessment will be the basis for the feasibility study (study of site remedies) so that the chemical concentration levels remaining after the remedy is in place will meet the United States Environmental Protection Agency (USEPA) requirements for protection of human health and the environment as described in 40 CFR 300.430 (e)(2) of the National Contingency Plan.

Three exposure pathways were considered in this assessment: (1) direct contact with soil (including ingestion and inhalation); (2) the soil component of the groundwater ingestion pathway; and (3) ingestion of vegetables. A Tier 1 evaluation was conducted for the direct contact with soil pathway and the soil component of the groundwater pathway. A Tier 3 evaluation was also conducted for the soil component of the groundwater pathway (for chemicals which exceeded Tier 1 values) and the ingestion of vegetables pathway.

The groundwater component of the groundwater ingestion pathway was previously addressed in the September 1995 Record of Decision (ROD). A separate risk assessment was prepared to address that pathway.

Sampling data collected from surface and subsurface soil from each of the four source areas were compared to the Tier 1 Exposure Route-Specific Values (ingestion and inhalation) (ERSVs) for soil protective of residential areas and the Soil Component of the Groundwater Ingestion Exposure Route Values (SCGVs) for Class I groundwater. The ERSVs are protective of direct contact with soil, while the SCGVs are protective of groundwater impacted by contaminants that could leach from soil. As directed by Illinois Environmental Protection Agency (EPA), it was assumed that all four source areas were, or could become, residential areas.

Because several chemicals exceeded Tier 1 objectives for soil that could impact groundwater, Tier 3 soil remediation objectives (SRO) were developed. The SRO is back-calculated from the Groundwater Remediation Objective (GRO) presented for class I Groundwater in section 742, Appendix B: Table F of TACO. While most of the GRO's are based on a hazard index of 1.0 or a cancer risk of one in one million, in some cases, the GRO is based on a higher cancer risk. A mixtures assessment was conducted according to the IEPA mixture rule issued under Docket C of the Illinois Pollution Control Board (December 4, 1997) to determine what the risks would be if all of the SROs for the soil to groundwater pathway were achieved. This assessment presented in Section 4.2, demonstrates that, in accordance with TACO, total cancer risk associated with the SROs for the soil to groundwater pathway would not exceed an excess lifetime risk of one in ten thousand or a hazard index of 1.0 if all SROs were achieved.

Result of the Direct Contact Pathway

The results of the assessment of the direct contact pathway can be summarized as follows:

1. Maximum concentrations of volatile organic compounds (VOCs) did not exceed their respective Tier 1 values in any of the focus areas.
2. Maximum concentrations of semi-volatile organic compound (SVOCs) and inorganics exceeded their respective ERSV Tier 1 values in all four areas.
3. Maximum concentrations of inorganic and one SVOC in area 7, benzo (a) pyrene, were dropped from further evaluation because detected concentrations were less than or consistent with background concentrations. Risk associated with these chemicals are below 1E-06 (one in one million) and/or a hazard index of 1.0.
4. Selected samples in Areas 4 (SS4-201, SS4-203, SS4-203D) and 11 (SS11-206, SS11-207) were identified as hot spots that exceeded a Tier 1 value and the Practical quantitation limit (PQL). Three out of four samples in Area 9/10 (SS910-101, SS910-103, SS910-104) exceeded one or more Tier 1 values. These data are presented in Appendix B. The hot spots in Areas 4 and 11 and the samples exceeding a Tier 1 value in Area 9/10 will be addressed in the Feasibility Study. The Feasibility study will evaluate whether or not additional SVOC data may be needed in the remedial design phase to better characterize risk and the extent of contamination. Based on the results of sampling, if necessary, remedial alternatives that address SVOCs would be developed and evaluated. The presence of these hot spots represents a potential exceedance of risk limits established by USEPA (a noncancer hazard index of 1.0 and cancer risks of between one in one million and one in one

hundred thousand) and Illinois EPA (a noncancer index of 1.0 and cancer risks of one in one million used to develop the Tier 1 values) depending on actual exposure.

Result of the Soil to Groundwater Pathway

The results of the assessment of the soil to groundwater pathway can be summarized as follows:

1. Several chemicals were dropped from further evaluation for the soil to groundwater pathway because they were not detected in groundwater (Dieldrin, carbazole and several SVOCs).
2. VOCs in surface soil in area 4 and VOCs in subsurface soil in all four areas exceeded Tier 1 SCGV values. These VOCs were further evaluated in Tier 3.

A Tier 3 assessment was conducted for those chemicals that exceeded a SCGV and were detected in groundwater during past sampling events at greater than 5 percent frequency of detection. The Tier 3 assessment consisted of calculating soil concentration protective of groundwater at a designated point of compliance

Result of the Soil Component of the Groundwater Ingestion Pathway

The results of the assessment of the soil component of the groundwater ingestion pathway can be summarized as follows:

1. Chemicals of concern in Areas 4, 7, and 11 exceed their respective SROs. Two additional chemicals of concern in Area 11 exceed their respective saturation concentrations, but not the calculated SRO. Risks associated with chemicals that exceed a SRO in areas 4, 7 and 11 exceed Illinois EPA cancer risk limits of one in one million or a hazard index of 1.0.
1. All areas where detected concentrations exceeded the lower of the SRO or saturation concentration were further evaluated in the Feasibility Study. Volume estimates were developed for these areas for excavation or remediation purposes.

Results of Homegrown Fruits and Vegetable Ingestion Pathway

Area 7 borders land currently used for agricultural purposes, and no current zoning restrictions prevent conversion of some of the undeveloped portions of Area 7 to agricultural use. For these reasons, a semi-quantitative evaluation was conducted to determine whether the use of Area 7 for growing vegetables or fruits would result in an unacceptable risk to human health.

Based on this evaluation, it is concluded that ingestion of vegetables (or fruits which have a fresh weight consumption rate lower than vegetables, i.e., 88 mg/day) would not result in exceedance of either a hazard index of 1.0 or a cancer risk of 1E-06 (one in one million), which are the risk limits on which the Tier 1 values are based.

Section 1

Introduction

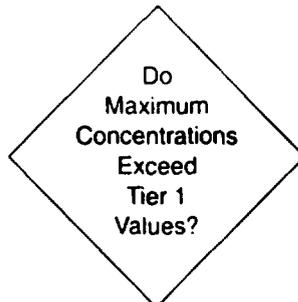
The Southeast Rockford Source Control Operable Unit (SCOU) study area contains four separate source areas - Areas 4, 7, 9/10, and 11. A description of these areas is provided in the Focused Feasibility Study. A risk assessment was conducted in order to develop soil remediation objectives for each of these four source areas. The risk assessment followed a tiered approach, in conformance with Tiered Approach to Corrective Action Objectives (TACO): 35 ILL.ADM.CODE PART 742. TACO specifies a three-tiered approach, and any, or all three tiers can be used. Tier 1 involves a comparison of chemical concentrations found at the site to pre-established screening values protective of three exposure pathways: (1) incidental ingestion of soil; (2) inhalation of chemicals that could volatilize from soil to ambient air; and (3) the soil component of the groundwater ingestion exposure route, i.e., leaching from soil to groundwater that could be used for drinking water. The first two exposure pathways will be referred to as the "direct contact" pathway. The screening values found in Tier 1 can be used as remediation objectives, or, for those chemicals with concentrations higher than the screening values, site-specific soil remediation objectives can be calculated using the methods and procedures described in Tier 2 or Tier 3. A combination of Tiers 1 and 3 were used in this risk assessment.

Chemical concentrations found at the site were compared to a combination of Tier 1 pre-established screening values, background concentrations and practical quantitation limits (PQLs). A PQL is the level at which a chemical can be reliably measured in the laboratory. The direct contact pathway and the soil to groundwater ingestion pathway were both evaluated in this matter. In addition, for the soil to groundwater ingestion pathway, Tier 3 was used to develop site-specific remediation objects for those chemicals whose concentrations exceeded values established under the Tier 1 assessment. Figure 1 summarizes the Tier 1 assessment that was conducted for the direct contact pathway. Figure 2 summarizes the assessment for the soil to groundwater ingestion pathway, which involved both Tiers 1 and 3.

Tier 3 was also used to evaluate ingestion of vegetables as part of a potential agricultural exposure scenario for Area 7. Based on land use in this area, the close proximity of farmland, and the absence of institutional controls, it was determined that an agricultural scenario could not be ruled out. Exposures associated with an agricultural scenario would be essentially the same as those associated with a residential scenario with the addition of potential ingestion of homegrown vegetables. Residential land use may also include ingestion of homegrown vegetables, however the Tier 1 values do not specifically address this pathway. For this reason, this pathway was evaluated separately as part of the Tier 3 assessment.

Tier 1 (Phase 1)

Compare to Tier 1 Values

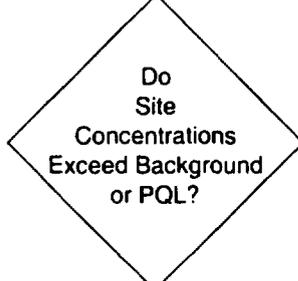


NO

Drop Chemical from Further Assessment (see tables 1-10)

YES

Compare to Background



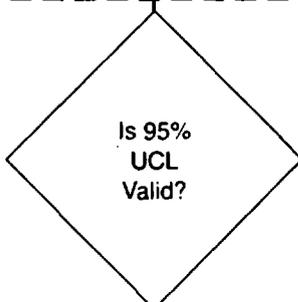
NO

Drop Chemical from Further Assessment (see tables 11-14)

YES

Tier 1 (Phase 2)

Calculate 95% UCL

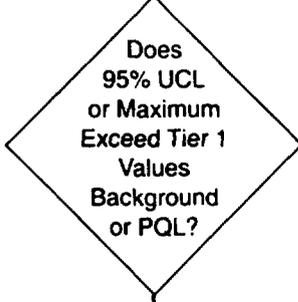


NO

Conduct Additional Statistical Tests Calculate New 95% UCL or Use Maximum (see Fig. 7)

YES

Compare to Tier 1 Values



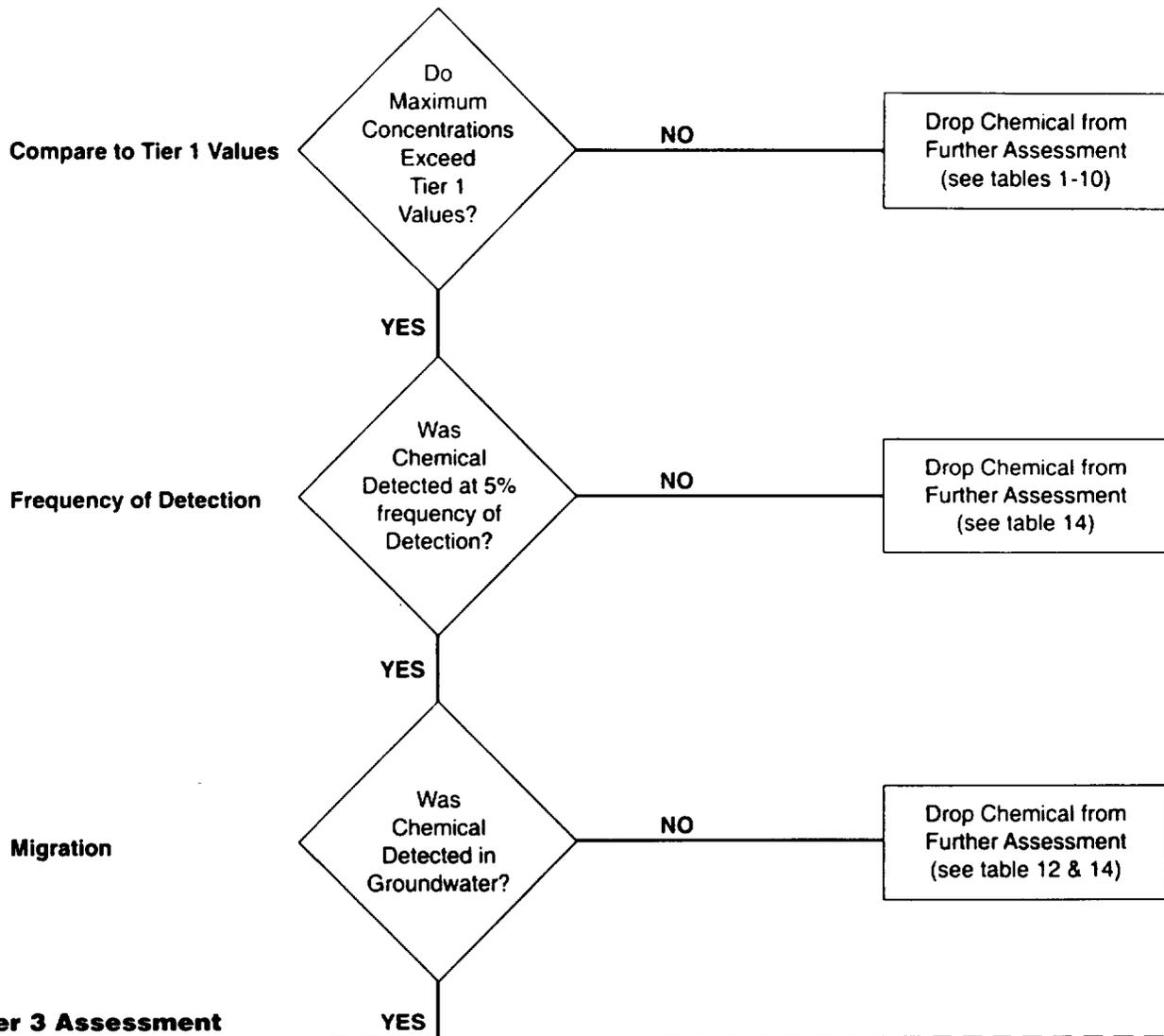
NO

Drop Chemical from Further Assessment

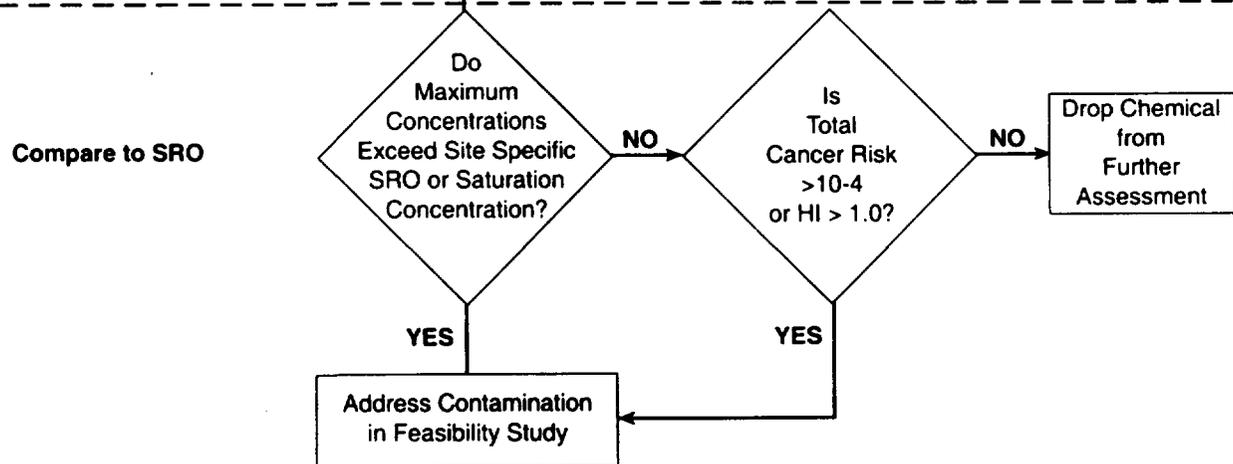
YES

Address Contamination in Feasibility Study

Tier 1 Assessment



Tier 3 Assessment



Southeast Rockford Source Control Operable Unit

Figure 2

Tier 3 Assessment for the Soil to Groundwater Pathway

Section 2

Scope

Three exposure pathways were considered in this assessment: (1) direct contact with soil; (2) the soil component of the groundwater ingestion pathway; and (3) ingestion of vegetables. The groundwater component of the groundwater ingestion pathway was previously addressed in the September 1995 Record of Decision (ROD). A separate risk assessment was prepared to address that pathway. This assessment was based on soil data and information collected during the Phase II Site Investigation and the SCOU Investigation. Soil gas and groundwater data were also used to determine the extent of contaminant migration and completeness of certain exposure pathways.

In 1993, on behalf of Illinois EPA, Camp Dresser & McKee conducted indoor and outdoor air sampling was conducted at 18 homes in Areas 4 and 7. In general, the chemicals and concentrations detected were typical of background conditions in indoor and outdoor air. Providing further evidence that indoor air concentrations did not originate from site contamination, soil gas concentrations were below detection limits in Area 7 beyond the immediate source area and in the portion of the site closed to residences. In Area 4, soil gas concentrations were elevated in the vicinity of Swebco Mfg. Inc.; however, residences in this area do not have basements. Infiltration of soil gas to indoor air is, therefore, not problematic for these homes. Two homes exhibited indoor air concentration above typical background concentration. At one of these homes, the homeowner explained to an official of the Illinois Department of Public Health that a sump located in the basement, which was likely the primary reason for the elevated indoor air concentrations, had been plugged following the indoor sampling event. The other home did not have a basement. For homes without basements, chemicals detected in indoor air are not likely to be associated with subsurface contamination. In Remedial Investigation Report Southeast Rockford Groundwater Contamination Study (CDM, June 1994), all concentrations detected in indoor air were found to be below risk-based concentrations.

Indoor air sampling was not conducted in Areas 9/10 and 11 because these areas are primarily industrial/commercial. No chemicals were detected in soil gas in Area 11 in these portions of the Area closest to residences. Soil gas concentrations of total chlorinated VOCs detected in Area 9/10 were below detection limits in those portions of the area closest to residences. Soil gas concentrations of benzene, toluene, ethyl benzene, and xylene (BTEX) were low to below detection limits. BTEX is ubiquitous in soil gas due to surface runoff that infiltrates the subsurface. The low concentrations of BTEX detected in soil gas in Area 9/10 were likely related to surface run off and not related to site wide contamination. For these reasons, conditions in Area 9/10 did not warrant indoor air sampling.

Sampling data collected from surface and subsurface soil from each of the four operable units were compared to the Tier 1 Exposure Route-Specific Values (ingestion and inhalation) (ERSVs) for soil protective of residential areas and the Soil Component of the Groundwater Ingestion Exposure Route Values (SCGVs) for Class I

groundwater. The ERSVs are protective of direct contact with soil, while the SCGVs are protective of groundwater impacted by contaminants that could leach from soil.

As directed by Illinois EPA, it was assumed that all four source areas were, or could become, residential areas. Currently, no land use restrictions are in place to prevent residential development or expansion, therefore, it was necessary to employ soil remedial objectives that would be protective of residential land use. Because the exposure assumptions for the residential scenario are standardized, with few site-specific modifications, there was no advantage to developing Tier 3 objectives for the residential scenario and Tier 1 values were used.

While a city ordinance is in place prohibiting the construction of new wells, private wells still exist within Southeast Rockford. For this reason, groundwater, beyond the active groundwater management zones (GMZ) in each area, will be protected to drinking water standards. Within the GMZ, active remediation will be taking place. The edge of the GMZ will be the point of compliance for groundwater. Because several chemicals exceeded Tier 1 objectives for soil that could impact groundwater, Tier 3 soil remediation objectives were developed. Soil objectives were developed to be protective of groundwater at the edge of the GMZ. As required by TACO, soil remediation objectives protective of the groundwater pathway are back calculated from the groundwater objective presented in Section 742, Appendix B, Table F. While most of the groundwater objectives are based on a hazard index of 1.0 or a cancer risk of one in one million, in some cases, the groundwater objective is based on a higher cancer risk. A mixtures assessment was conducted according to the Illinois EPA mixture rule issued under Docket C of the Illinois Pollution Control Board (December 4, 1997) to determine risks if all of the SROs for the soil to groundwater pathway were achieved. This assessment, presented in Section 4.2, demonstrates that, in accordance with TACO, total cancer risk associated with the SROs for the soil to groundwater pathway would not exceed an excess lifetime risk of one in ten thousand or a hazard index of 1.0, if all SROs were achieved.

Section 3

Tier 1 Assessment

TACO is a step-wise procedure for determining chemicals of concern and developing cleanup objectives for those chemicals. While the tiered approach presents specific methods for selecting or developing remediation objectives, detailed guidance is also presented on associated issues such as the statistical evaluation of data, collecting and using background data, and establishing points of compliance. The procedures used in this assessment were derived from the TACO regulations and guidance. In addition, Illinois EPA staffs were consulted for guidance on several issues that were not specifically addressed in the TACO regulations. Tier 1 was conducted in two phases. In phase 1, both the direct contact pathway and the soil to groundwater ingestion pathway were evaluated. Phase 2 examined only the direct contact pathway.

3.1 Tier 1 - Phase 1

Tier 1 -Phase 1 evaluates both the direct contact pathway and the soil to groundwater ingestion pathway. The Tier 1 assessment involved the following steps:

1. Compile sampling and analysis data collected during the Phase I and SCOU sampling events.
2. Segregate data into surface (0-3 feet) and subsurface (>3 feet) soil samples. Segregate subsurface data into data sets representing soil between three and ten feet and below ten feet.
3. Summarize sampling and analysis data (range of detected concentrations, frequency of detection).
4. Compare maximum concentrations to Tier 1 values and identify exceedances of ERSVs or SCGVs.
5. Compare chemicals to background concentrations reported in TACO and site-specific background.

Tables 1 through 10 summarize the soil data collected from the four source areas. The data were segregated into three strata: (1) surface soil data (0-3 feet); (2) subsurface soil data between three and ten feet; and (3) subsurface soil data below ten feet. The data were segregated this way to reflect the different exposures that could occur at different soil depths. Tables 1 through 4 present surface soil data for all four areas; Tables 5 and 6 present subsurface soil data between three and ten feet for Areas 4 and 7. No subsurface soil samples between three and ten feet were collected from Areas 9/10 and 11. Tables 7 through 10 present subsurface soil data below ten feet for all four areas. Consistent with TACO guidance, residential exposure to soil could occur from the surface to a depth of ten feet. Surface soil data and subsurface soil data above ten feet were compared to the Tier 1 ERSVs as well as to the SCGVs for the protection of residential areas and Class I groundwater. Subsurface soil data below

Table I
S.E. Rockford Source Area Risk Assessment - Area 4 Surface Soil

Parameter	Surface Soil - Area 4					
	Range of Detected Concentrations	Proportion of Samples With Detections		Residential Soil Objective (Lower of inhal/inges)	Soil Component of GW Ingestion Route Values	Background
Volatiles Organics (ug/kg)						
Methylene Chloride	12 - 18	2 / 8	(25%)	13 000	20	
1,2-Dichloroethene (total)	3 - 3	1 / 8	(13%)	780,000 (3)	400	
1,2-Dichloroethane	17 - 17	1 / 8	(13%)	400	20	
1,1,1-Trichloroethane	7 - 110	2 / 8	(25%)	1 200,000	2 000	
1,2-Dichloropropane	1 - 2	2 / 8	(25%)	9 000	30	
Trichloroethene	25 - 25	1 / 8	(13%)	5 000	60	
Toluene	3 - 11	2 / 8	(25%)	650,000	12,000	
Semivolatile Organics (ug/kg)						
Naphthalene	49 - 260	3 / 8	(38%)	3 100 000	84 000	297
2-Methylnaphthalene	58 - 120	3 / 8	(38%)	NA	NA	297
Acenaphthene	850 - 960	2 / 8	(25%)	4,700,000	570,000	297
Dibenzofuran	420 - 550	2 / 8	(25%)	NA	NA	
Fluorene	720 - 920	2 / 8	(25%)	3,100,000	560,000	297
Phenanthrene	150 - 16 000	5 / 8	(63%)	NA	NA	445
Anthracene	50 - 1,000	4 / 8	(50%)	23,000,000	12,000,000	195
Carbazole	48 - 1,400	4 / 8	(50%)	32,000	600	
Di-n-Butylphthalate	51 - 100	5 / 8	(63%)	2,300,000	2,300,000	
Fluoranthene	44 - 12,000	8 / 8	(100%)	3,100,000	4,300,000	809
Pyrene	45 - 5,000	7 / 8	(88%)	2,300,000	4,200,000	670
Butylbenzylphthalate	60 - 180	3 / 8	(38%)	930,000	930,000	
Benzo(a)anthracene	53 - 5,800	5 / 8	(63%)	900	2,000	401
Chrysene	72 - 5,900	7 / 8	(88%)	88 000	160 000	431
bis(2-Ethylhexyl)Phthalate	300 - 9,000	8 / 8	(100%)	46 000	3 600 000	
Di-n-Octyl Phthalate	67 - 67	1 / 8	(13%)	1 600 000	10 000 000	
Benzo (b) Fluoranthene	67 - 11,000	8 / 8	(100%)	900	5 000	539
Benzo (k) Fluoranthene	70 - 11,000	8 / 8	(100%)	900	49 000	301
Benzo (a) Pyrene	97 - 1,100	5 / 8	(63%)	90	8 000	389
Indeno (1,2,3-cd) Pyrene	75 - 620	4 / 8	(50%)	900	14,000	317
Dibenzo (a,h) Anthracene	41 - 430	4 / 8	(50%)	90	2,000	297
Benzo (g,h,i) Perylene	56 - 70	2 / 8	(25%)	NA	NA	329
Pesticides & PCBs (ug/kg)						
delta-BHC	0 095 - 0 29	3 / 8	(38%)	NA	NA	
Aldrin	0 29 - 0 39	2 / 8	(25%)	40	500	
Heptachlor epoxide	0 52 - 2	3 / 8	(38%)	70	700	
Endosulfan I	0 13 - 0 13	1 / 8	(13%)	470 000	18 000	
Dieldrin	0 29 - 3 9	5 / 8	(63%)	40	4	
4,4'-DDE	0 83 - 3 9	4 / 8	(50%)	2 000	54 000	
Endrin	0 61 - 0 61	1 / 8	(13%)	23 000	1 000	
Endosulfan II	0 2 - 0 4	3 / 8	(38%)	470 000	18 000	
4,4'-DDD	0 13 - 4 3	6 / 8	(75%)	3 000	16 000	
4,4'-DDT	3 7 - 2 2	4 / 8	(50%)	2 000	32 000	
Methoxychlor	1 2 - 2 6	5 / 8	(63%)	390 000	160 000	
Endrin ketone	0 3 - 0 34	2 / 8	(25%)	23 000	1 000	
Endrin aldehyde	0 33 - 1 7	5 / 8	(63%)	23 000	1 000	
alpha-Chlordane	0 2 - 3 9	6 / 8	(75%)	500	10 000	
gamma-Chlordane	1 1 - 2 7	2 / 8	(25%)	500	10 000	
Aroclor-1254	8 4 - 4 9	4 / 8	(50%)	1 000	NA	
Aroclor-1260	100 - 100	1 / 8	(13%)	1 000	NA	
Inorganics (mg/Kg)						
Aluminum	2,550 - 11,500	8 / 8	(100%)	NA		9500
Antimony	7 3 - 7 6	2 / 8	(25%)	31		4
Arsenic	2 8 - 6 2	8 / 8	(100%)	0 4		7 2
Barium	27 - 216	8 / 8	(100%)	5,500		110
Beryllium	0 28 - 0 7	8 / 8	(100%)	0 1		0 6
Cadmium	0 43 - 7 4	7 / 8	(88%)	7 8		0 6
Calcium	2,590 - 131,000	8 / 8	(100%)	NA		9300
Chromium	5 4 - 5 7 5	8 / 8	(100%)	270		16 2
Cobalt	2 8 - 6 2	8 / 8	(100%)	4,700		8 9
Copper	7 8 - 14 8	8 / 8	(100%)	2,900		20
Iron	7,390 - 13,600	8 / 8	(100%)	NA		15900
Lead	15 1 - 11 2	8 / 8	(100%)	400		3 6
Magnesium	1,530 - 83,700	8 / 8	(100%)	NA		4820
Manganese	2 64 - 5 9 2	8 / 8	(100%)	1,700		6 3 6
Nickel	6 8 - 1 8 8	8 / 8	(100%)	1,600		1 8
Potassium	2 9 6 - 1 14 0	8 / 8	(100%)	NA		1 2 6 8
Selenium	0 9 2 - 1 2	4 / 8	(50%)	3 9 0		0 5
Silver	0 9 4 - 0 9 4	1 / 8	(13%)	3 9 0		0 6
Sodium	7 0 8 - 2 7 9	8 / 8	(100%)	NA		1 3 0
Thallium	1 3 - 2 4	7 / 8	(88%)	6 3		0 3
Vanadium	9 9 - 2 9 4	8 / 8	(100%)	5 5 0		2 5
Zinc	3 4 - 7 4 2	8 / 8	(100%)	2 3 0 0 0		9 5
Cyanide	0 2 3 - 4 8	4 / 8	(50%)	1,600		0 5

Notes:

NA = Criterion not available.

(1) ***Bold italicized*** values exceed human health criterion or groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.

(2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table A: Tier 1 Soil Remediation Objectives for Residential Properties. The lower of the Ingestion or Inhalation exposure route specific values was used. (2) Appendix A, Table G: Concentration of Inorganic Chemicals in Background Soils; and (3) Site-specific background concentrations for PAHs.

(3) Standard for cis-1,2-DCE used for 1,2-Dichloroethene

Table 2
S.E. Rockford Source Area Risk Assessment - Area 7 Surface Soil

Parameter	Surface Soil Area 7					
	Range of Detected Concentrations	Proportion of Samples With Detections		Residential Soil Objective (Lower of inhal/inges)	Soil Component of GW Ingestion Route Values	Background
Volatile Organics (ug/kg)						
Methylene Chloride	4 - 33	7 / 12	(58%)	13,000	20	
Acetone	8 - 62	6 / 12	(50%)	7,800,000	16,000	
1,1-Dichloroethane	8 - 8	1 / 12	(8%)	1,300,000	23,000	
1,2-Dichloroethene (total)	220 - 220	1 / 12	(8%)	780,000 (3)	400	
1,2-Dichloroethane	7 - 8	2 / 12	(17%)	400	20	
1,1,1-Trichloroethane	5 - 40	3 / 12	(25%)	1,200,000	2,000	
Trichloroethene	4 - 140	2 / 12	(17%)	1,200,000	2,000	
Tetrachloroethene	5 - 400	4 / 12	(33%)	11,000	60	
1,1,2,2-Tetrachloroethane	12 - 12	1 / 12	(8%)	NA	NA	
Toluene	1 - 7	4 / 12	(33%)	650,000	12,000	
Semivolatile Organics (ug/kg)						
Isophorone	150 - 150	1 / 12	(8%)	4,600,000	8,000	
Fluoranthene	42 - 42	1 / 12	(8%)	3,100,000	4,300,000	809
Pyrene	37 - 37	1 / 12	(8%)	2,300,000	4,200,000	670
bis(2-Ethylhexyl)Phthalate	46 - 570	12 / 12	(100%)	46,000	3,600,000	
Benzo (a) Pyrene	170 - 170	1 / 12	(8%)	90	8,000	389
Pesticides & PCBs (ug/kg)						
Dieldrin	5.3 - 38	3 / 12	(25%)	40	4	
4,4'-DDE	13 - 13	1 / 12	(8%)	2,000	54,000	
Endosulfan II	15 - 15	1 / 12	(8%)	470,000	18,000	
4,4'-DDT	5.8 - 35	3 / 12	(25%)	2,000	32,000	
Endrin aldehyde	5.1 - 33	4 / 12	(33%)	23,000 (4)	1,000	
gamma-Chlordane	20 - 20	1 / 12	(8%)	500	10,000	
Aroclor-1260	450 - 450	1 / 12	(8%)	1,000	NA	
Inorganics (mg/Kg)						
Aluminum	8,630 - 15,800	12 / 12	(100%)	NA		9,500
Antimony	9.4 - 12.7	7 / 12	(58%)	31		4
Arsenic	3.6 - 6.8	12 / 12	(100%)	0.4		7.2
Barium	41.6 - 260	12 / 12	(100%)	5,500		110
Beryllium	0.13 - 0.66	12 / 12	(100%)	0.1		0.59
Cadmium	1.6 - 1.6	1 / 12	(8%)	78		0.6
Calcium	929 - 27,100	12 / 12	(100%)	NA		9,300
Chromium	10.1 - 55.1	12 / 12	(100%)	270		16.2
Cobalt	5.2 - 11.3	12 / 12	(100%)	4,700		8.4
Copper	7.6 - 148	12 / 12	(100%)	2,900		19.6
Iron	10,600 - 19,200	12 / 12	(100%)	NA		15,900
Lead	9.7 - 217	12 / 12	(100%)	400		36
Magnesium	1,400 - 17,400	12 / 12	(100%)	NA		4,820
Manganese	292 - 698	12 / 12	(100%)	3,700		636
Mercury	0.06 - 2.2	3 / 12	(25%)	10		0.06
Nickel	7.3 - 49.1	12 / 12	(100%)	1,600		18
Potassium	800 - 1,550	12 / 12	(100%)	NA		1,268
Selenium	0.92 - 1.4	8 / 12	(67%)	390		0.48
Silver	1.4 - 1.4	1 / 12	(8%)	390		0.55
Sodium	26.7 - 178	12 / 12	(100%)	NA		130
Thallium	1.9 - 2.1	2 / 12	(17%)	6		0.32
Vanadium	19.2 - 36.4	12 / 12	(100%)	550		25.2
Zinc	31.3 - 177	12 / 12	(100%)	23,000		95
Cyanide	0.25 - 2.9	6 / 12	(50%)	1,600		0.51

Notes:

NA = Criterion not available.

- (1) **Italicized** values exceed human health criterion or groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.
- (2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table A: Tier 1 Soil Remediation Objectives for Residential Properties. The lower of the Ingestion or Inhalation exposure route specific values was used. (2) Appendix A, Table G: Concentration of Inorganic Chemicals in Background Soils; and (3) Site-specific background concentrations for PAHs.
- (3) Standard for cis-1,2-DCE used for 1,2-Dichloroethene (total).
- (4) Standard for endrin used for endrin aldehyde.

Table 3
S.E. Rockford Source Area Risk Assessment - Area 9/10 Surface Soil

Parameter	Surface Soils - Area 9/10					
	Range of Detected Concentrations	Proportion of Samples With Detections		Residential Soil Objective (Lower of Inges/inhal)	Soil Component of GW Ingestion Route Values	Background
<i>Volatile Organics (ug/Kg)</i>						
Methylene Chloride	2 - 3	2 / 5	(40%)	13,000	20	
Toluene	11 - 11	1 / 5	(20%)	650,000	12,000	
<i>Semivolatile Organics (ug/Kg)</i>						
Naphthalene	320 - 320	1 / 4	(25%)	3,100,000	84,000	297
2-Methylnaphthalene	250 - 250	1 / 4	(25%)	NA	NA	297
Acenaphthene	200 - 350	2 / 4	(50%)	4,700,000	570,000	297
Dibenzofuran	190 - 190	1 / 4	(25%)	NA	NA	
Fluorene	190 - 340	2 / 4	(50%)	3,100,000	560,000	297
Phenanthrene	400 - 3,600	4 / 4	(100%)	NA	NA	446
Anthracene	55 - 640	4 / 4	(100%)	23,000,000	12,000,000	195
Carbazole	59 - 530	4 / 4	(100%)	32,000	600	
Di-n-Butylphthalate	1,200 - 1,600	2 / 4	(50%)	2,300,000	2,300,000	
Fluoranthene	650 - 4,800	4 / 4	(100%)	3,100,000	4,300,000	809
Pyrene	580 - 4,200	4 / 4	(100%)	2,300,000	4,200,000	670
Butylbenzylphthalate	60 - 660	2 / 4	(50%)	930,000	930,000	
<i>Benzo(a)anthracene</i>	330 - 2,300	4 / 4	(100%)	900	2,000	401
Chrysene	310 - 2,100	4 / 4	(100%)	88,000	160,000	431
bis(2-Ethylhexyl)Phthalate	130 - 7,400	4 / 4	(100%)	46,000	3,600,000	
<i>Benzo (b) Fluoranthene</i>	420 - 2,800	4 / 4	(100%)	900	5,000	539
Benzo (k) Fluoranthene	220 - 890	4 / 4	(100%)	900	49,000	301
<i>Benzo (a) Pyrene</i>	260 - 1,700	4 / 4	(100%)	90	8,000	389
<i>Indeno (1,2,3-cd) Pyrene</i>	230 - 1,300	4 / 4	(100%)	900	14,000	317
Benzo (g,h,i) Perylene	270 - 1,400	4 / 4	(100%)	NA	NA	329
<i>Pesticides & PCBs (ug/Kg)</i>						
Heptachlor epoxide	2.5 - 2.5	1 / 4	(25%)	70	700	
<i>Dieldrin</i>	4.1 - 54	2 / 4	(50%)	40	4	
4,4'-DDE	17 - 17	1 / 4	(25%)	2,000	54,000	
4,4'-DDD	7.1 - 7.1	1 / 4	(25%)	3,000	16,000	
4,4'-DDT	7 - 41	2 / 4	(50%)	2,000	32,000	
gamma-Chlordane	2 - 2	1 / 4	(25%)	500	10,000	
Aroclor-1254	30 - 30	1 / 4	(25%)	1,000	NA	
<i>Inorganics (mg/Kg)</i>						
Aluminum	2,550 - 8,860	6 / 6	(100%)	NA		9,500
<i>Arsenic</i>	2.8 - 6.2	6 / 6	(100%)	0.4		7.2
Barium	27 - 119	6 / 6	(100%)	5500		110
<i>Beryllium</i>	0.35 - 0.7	6 / 6	(100%)	0.1		0.59
Cadmium	0.43 - 1.2	5 / 6	(83%)	78		0.6
Calcium	2,590 - 131,000	6 / 6	(100%)	NA		9,300
Chromium	5.4 - 15.4	6 / 6	(100%)	270		16.2
Cobalt	2.8 - 6.2	6 / 6	(100%)	4700		8.9
Copper	7.8 - 148	6 / 6	(100%)	2900		19.6
Iron	7,390 - 13,600	6 / 6	(100%)	NA		15,900
Lead	15.1 - 112	6 / 6	(100%)	400		36
Magnesium	1530 - 83,700	6 / 6	(100%)	NA		4,820
Manganese	264 - 592	6 / 6	(100%)	3700		636
Nickel	6.8 - 13.8	6 / 6	(100%)	1600		18
Potassium	296 - 856	6 / 6	(100%)	NA		1,268
Sodium	70.8 - 279	6 / 6	(100%)	NA		130
Vanadium	9.9 - 26.1	6 / 6	(100%)	550		25.2
Zinc	34 - 742	6 / 6	(100%)	23000		95
Cyanide	0.23 - 0.46	3 / 6	(50%)	1600		0.51

NOTES:

NA = Criterion not available.

- (1) ***Bold italicized*** values exceed human health criterion or groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.
- (2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table A: Tier 1 Soil Remediation Objectives for Residential Properties. The lower of the Ingestion or Inhalation exposure route specific values
- (2) Appendix A, Table G: Concentration of Inorganic Chemicals in Background Soils; and (3) Site-specific background concentrations for PAHs
- (3) Standard for chlordane used for gamma chlordane.

Table 4
S.E. Rockford Source Area Risk Assessment - Area 11 Surface Soil

Parameter	Surface Soils - Area 11				
	Range of Detected Concentrations	Proportion of Samples With Detections	Residential Soil Objective (Lower of inges/inhal)	Soil Component of GW Ingestion Route Values	Background
Volatile Organics (ug/Kg)					
No Hits					
Semivolatile Organics (ug/Kg)					
Naphthalene	42 - 15,000	2 / 7 (29%)	3,100,000	84,000	297
2-Methylnaphthalene	45 - 45	1 / 7 (14%)	NA	NA	297
Acenaphthene	70 - 39,000	2 / 7 (29%)	4,700,000	570,000	297
Dibenzofuran	57 - 33,000	2 / 7 (29%)	NA	NA	
Fluorene	130 - 47,000	2 / 7 (29%)	3,100,000	560,000	297
Phenanthrene	54 - 370,000	7 / 7 (100%)	NA	NA	446
Anthracene	160 - 93,000	2 / 7 (29%)	23,000,000	12,000,000	195
Carbazole	65 - 67,000	2 / 7 (29%)	32,000	600	
Di-n-Butylphthalate	94 - 5,200	5 / 7 (71%)	2,300,000	2,300,000	
Fluoranthene	110 - 440,000	7 / 7 (100%)	3,100,000	4,300,000	809
Pyrene	57 - 430,000	4 / 7 (57%)	2,300,000	4,200,000	670
Butylbenzylphthalate	44 - 44	1 / 7 (14%)	930,000	930,000	
Benzo(a)anthracene	69 - 200,000	7 / 7 (100%)	900	2,000	401
Chrysene	52 - 240,000	7 / 7 (100%)	88,000	160,000	431
bis(2-Ethylhexyl)Phthalate	880 - 40,000	7 / 7 (100%)	46,000	3,600,000	
Di-n-Octyl Phthalate	66 - 100	2 / 7 (29%)	1,600,000	10,000,000	
Benzo (b) Fluoranthene	86 - 220,000	7 / 7 (100%)	900	5,000	539
Benzo (k) Fluoranthene	46 - 130,000	7 / 7 (100%)	900	49,000	301
Benzo (a) Pyrene	96 - 150,000	3 / 7 (43%)	90	8,000	389
Indeno (1,2,3-cd) Pyrene	63 - 120,000	3 / 7 (43%)	900	14,000	317
Dibenzo (a,h) Anthracene	70 - 70	1 / 7 (14%)	90	2,000	297
Benzo (g,h,i) Perylene	2,000 - 120,000	2 / 7 (29%)	NA	NA	329
Pesticides & PCBs (ug/Kg)					
delta-BHC	0.24 - 0.38	2 / 7 (29%)	NA	NA	
Heptachlor	13 - 13	1 / 7 (14%)	100	23,000	
Aldrin	0.69 - 2.3	2 / 7 (29%)	40	500	
Heptachlor epoxide	0.54 - 24	2 / 7 (29%)	70	700	
Endosulfan I	0.64 - 0.64	1 / 7 (14%)	470,000	18,000	
Dieldrin	0.11 - 10	6 / 7 (86%)	40	4	
4,4'-DDE	0.79 - 3.5	2 / 7 (29%)	2,000	54,000	
Endrin	0.68 - 1.2	2 / 7 (29%)	23,000	1,000	
Endosulfan II	0.36 - 3.2	2 / 7 (29%)	470,000	18,000	
4,4'-DDD	0.34 - 12	3 / 7 (43%)	3,000	16,000	
4,4'-DDT	0.94 - 0.94	1 / 7 (14%)	2,000	32,000	
Methoxychlor	4.8 - 30	5 / 7 (71%)	390,000	160,000	
Endrin ketone	1.1 - 11	2 / 7 (29%)	23,000	1,000	
Endrin aldehyde	0.47 - 9.7	3 / 7 (43%)	23,000	1,000	
alpha-Chlordane	0.35 - 120	6 / 7 (86%)	500	10,000	
gamma-Chlordane	3 - 180	2 / 7 (29%)	500	10,000	
Aroclor-1254	31 - 530	4 / 7 (57%)	1,000	NA	
Aroclor-1260	350 - 450	2 / 7 (29%)	1,000	NA	
Inorganics (mg/Kg)					
Aluminum	2,550 - 8,860	6 / 6 (100%)	NA		9,500
Antimony	0.52 - 0.55	2 / 7 (29%)	31		4.0
Arsenic	2.8 - 6.2	6 / 6 (100%)	0.4		7.2
Barium	27 - 119	6 / 6 (100%)	5,500		110
Beryllium	0.35 - 0.7	6 / 6 (100%)	0.1		0.59
Cadmium	0.43 - 1.2	5 / 6 (83%)	78		0.6
Calcium	2,590 - 131,000	6 / 6 (100%)	NA		9,300
Chromium	5.4 - 15.4	6 / 6 (100%)	270		16.2
Cobalt	2.8 - 6.2	6 / 6 (100%)	4,700		8.9
Copper	7.8 - 148	6 / 6 (100%)	2,900		19.6
Iron	7,390 - 13,600	6 / 6 (100%)	NA		15,900
Lead	15.1 - 112	6 / 6 (100%)	400		36
Magnesium	1,530 - 83,700	6 / 6 (100%)	NA		4,820
Manganese	264 - 592	6 / 6 (100%)	3,700		636
Mercury	0.06 - 0.08	2 / 7 (29%)	10		0.06
Nickel	6.8 - 13.8	6 / 6 (100%)	1,600		18
Potassium	296 - 856	6 / 6 (100%)	NA		1,268
Selenium	0.92 - 1.1	3 / 6 (50%)	390		0.48
Sodium	70.8 - 279	6 / 6 (100%)	NA		130
Thallium	1.3 - 2.4	6 / 6 (100%)	3		0.32
Vanadium	9.9 - 28.1	6 / 6 (100%)	550		25.2
Zinc	34 - 742	6 / 6 (100%)	23,000		95
Cyanide	0.23 - 0.46	3 / 6 (50%)	1,600		0.51

NOTES:

NA = Criterion not available.

(1) **Bold italicized values** exceed human health criterion or groundwater protection criterion. Chemicals will be evaluated in Tier 1 Phase 2 or Tier 3.

(2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table A: Tier 1 Soil Remediation Objectives for Residential Properties. The lower of the Ingestion or Inhalation exposure route specific values

(2) Appendix A, Table G: Concentration of Inorganic Chemicals in Background Soils; and (3) Site-specific background concentrations for PAHs.

(3) Standard for endosulfan used for endosulfan II.

(4) Standard for endrin used for endrin ketone and endrin aldehyde.

(5) Standard for chlordane used for alpha and gamma chlordane.

Table 5
S.E. Rockford Source Area Risk Assessment - Area 4 Subsurface Soil: Above 10 Feet

Parameter	Subsurface Soil - Area 4			
	Range of Detected Concentrations	Proportion of Samples With Detections	Residential Soil Objective (Lower of inhal/inges)	Soil Component of GW Ingestion Route Value
<i>Volatile Organics (ug/Kg)</i>	ND			
<i>Semivolatile Organics (ug/Kg)</i>	ND			
<i>Pesticides & PCBs (ug/Kg)</i>				
gamma-BHC (Lindane)	0.12 - 0.12	1 / 1 (100)%	NA	NA
Endosulfan II	0.22 - 0.22	1 / 1 (100)%	470,000	18,000
4,4'-DDD	0.24 - 0.24	1 / 1 (100)%	3,000	16,000

Notes:

NA = Criterion not available.

No exceedances.

(1) All samples collected above 10 feet.

Table 6
S.E. Rockford Source Area Risk Assessment - Area 7 Subsurface Soil: Above 10 Feet

Parameter	Subsurface Soil - Area 7			
	Range of Detected Concentrations	Proportion of Samples With Detections	Residential Soil Objective (Lower of inhal/inges)	Soil Component of GW Ingestion Route Value
<i>Volatile Organics (ug/Kg)</i>				
Methylene Chloride	6 - 6	1 / 4 (25)%	13,000	20
Acetone	10 - 8,400	3 / 4 (75)%	7,800,000	16,000
Carbon Disulfide	2 - 2	1 / 4 (25)%	720,000	32,000
1,1-Dichloroethene	3 - 3	1 / 4 (25)%	700,000	60
1,1-Dichloroethane	39 - 39	1 / 4 (25)%	1,300,000	23,000
<i>1,2-Dichloroethene (total)</i>	<i>5 - 49,000</i>	<i>2 / 4 (50)%</i>	<i>780,000 (3)</i>	<i>400</i>
<i>1,1,1-Trichloroethane</i>	<i>11 - 360,000</i>	<i>4 / 4 (100)%</i>	<i>1,200,000</i>	<i>2,000</i>
<i>Trichloroethene</i>	<i>3 - 24,000</i>	<i>4 / 4 (100)%</i>	<i>5,000</i>	<i>60</i>
1,1,2-Trichloroethane	4 - 4	1 / 4 (25)%	310,000	20
<i>Tetrachloroethene</i>	<i>29 - 110,000</i>	<i>4 / 4 (100)%</i>	<i>11,000</i>	<i>60</i>
<i>Toluene</i>	<i>1 - 23,000</i>	<i>3 / 4 (75)%</i>	<i>650,000</i>	<i>12,000</i>
<i>Ethylbenzene</i>	<i>2 - 26,000</i>	<i>3 / 4 (75)%</i>	<i>400,000</i>	<i>13,000</i>
Styrene	1,600 - 1,600	1 / 4 (25)%	1,500,000	4,000
<i>Xylene</i>	<i>11 - 210,000</i>	<i>3 / 4 (75)%</i>	<i>160,000,000</i>	<i>200,000</i>
<i>Semivolatile Organics (ug/Kg)</i>				
Naphthalene	1,000 - 15,000	2 / 3 (67)%	3,100,000	84,000
2-Methylnaphthalene	1,100 - 10,000	2 / 3 (67)%	NA	NA
<i>2,4-Dinitrotoluene</i>	<i>1,500 - 1,500</i>	<i>1 / 3 (33)%</i>	<i>900</i>	<i>0.8</i>
Diethylphthalate	33 - 33	1 / 3 (33)%	2,000,000	470,000
Fluorene	130 - 130	1 / 3 (33)%	7,100,000	560,000
Phenanthrene	140 - 140	1 / 3 (33)%	NA	NA
Di-n-Butylphthalate	49 - 2,100	2 / 3 (67)%	2,300,000	2,300,000
bis(2-Ethylhexyl)Phthalate	110 - 1,200	2 / 3 (67)%	46,000	3,600,000
<i>Pesticides & PCBs (ug/Kg)</i>				
Heptachlor epoxide	3.3 - 3.3	1 / 3 (33)%	70	700
Aroclor-1254	480 - 480	1 / 3 (33)%	1,000	NA

Notes:

NA = Criterion not available.

- (1) ***Bold italicized*** values exceed human health criterion or groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.
- (2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table A: Tier Soil Remediation Objectives for Residential Properties. The lower of the Ingestion or Inhalation exposure route specific values was used.
- (3) Standard for cis-1,2-Dichloroethylene used for 1,2-Dichloroethene (total).
- (4) All samples collected above 10 feet.

Table 7

S.E. Rockford Source Area Risk Assessment - Area 4 Subsurface Soil: Below 10 Feet

Parameter	Subsurface Soil - Area 4		
	Range of Detected Concentrations	Proportion of Samples With Detections	Soil Component of GW Ingestion Route Value
<u>Volatile Organics (ug/Kg)</u>			
Methylene Chloride	4 - 4	1 / 25 (4%)	20
Acetone	5 - 9	4 / 25 (16%)	16,000
1,1,1-Trichloroethane	2 - 510,000	7 / 25 (28%)	2,000
Benzene	2 - 2	1 / 25 (4%)	30
Tetrachloroethene	1 - 1	1 / 25 (4%)	60
Toluene	2 - 41	4 / 25 (16%)	12,000
Chlorobenzene	2 - 2	3 / 25 (12%)	1,000
<u>Semivolatile Organics (ug/Kg)</u>			
Naphthalene	470 - 3,000	2 / 8 (25%)	84,000
2-Methylnaphthalene	1,600 - 1,600	1 / 8 (13%)	NA
Phenanthrene	580 - 580	1 / 8 (13%)	NA
bis(2-Ethylhexyl)Phthalate	23 - 260	4 / 8 (50%)	3,600,000
<u>Pesticides & PCBs (ug/Kg)</u>			
alpha-BHC	2.8 - 4	2 / 8 (25%)	NA
beta-BHC	5.9 - 5.9	1 / 8 (13%)	NA
delta-BHC	1.8 - 1.8	1 / 8 (13%)	NA
gamma-BHC (Lindane)	0.14 - 1.6	2 / 8 (25%)	NA
Heptachlor	1.6 - 5.2	2 / 8 (25%)	23,000
Aldrin	2.3 - 2.3	1 / 8 (13%)	500
Endosulfan I	5.6 - 5.7	2 / 8 (25%)	18,000
4,4'-DDE	0.21 - 0.34	3 / 8 (38%)	54,000
Endosulfan II	0.17 - 0.44	4 / 8 (50%)	18,000
4,4'-DDT	0.59 - 0.59	1 / 8 (13%)	32,000
Methoxychlor	3.7 - 3.7	1 / 8 (13%)	160,000
Endrin aldehyde	0.78 - 1.5	2 / 8 (25%)	1,000

Notes:

NA = Criterion not available.

- (1) ***Bold italicized*** values exceed groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.
- (2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Soil Remediation Objectives for Residential Properties.

Table 8

S.E. Rockford Source Area Risk Assessment - Area 7 Subsurface Soil: Below 10 Feet

Parameter	Subsurface Soil - Area 7			
	Range of Detected Concentrations	Proportion of Samples With Detections		Soil Component of GW Ingestion Route Value
<i>Volatile Organics (ug/Kg)</i>				
Methylene Chloride	12 - 12	1 / 52	2%	20
Acetone	8 - 140	13 / 52	25%	16,000
1,1-Dichloroethene	4 - 1,300	3 / 52	6%	60
1,1-Dichloroethane	2 - 2,900	13 / 52	25%	23,000
1,2-Dichloroethene (total)	1 - 47,000	29 / 52	56%	400
Chloroform	570 - 570	1 / 52	2%	0.6
1,2-Dichloroethane	2 - 180	4 / 52	8%	20
2-Butanone	13 - 1,500	2 / 52	4%	NA
1,1,1-Trichloroethane	1 - 460,000	36 / 52	69%	2,000
Trichloroethene	2 - 130,000	24 / 52	46%	60
1,1,2-Trichloroethane	460 - 460	1 / 52	2%	20
Benzene	220 - 220	1 / 52	2%	30
4-Methyl-2-Pentanone	3 - 82	4 / 52	8%	NA
Tetrachloroethene	1 - 260,000	34 / 52	65%	60
Toluene	1 - 23,000	29 / 52	56%	12,000
Chlorobenzene	1,600 - 1,600	1 / 52	2%	1,000
Ethylbenzene	1 - 31,000	18 / 52	35%	13,000
Styrene	0 - 0	0 / 52	0%	4,000
Xylene	2 - 190,000	23 / 52	44%	200,000
<i>Semivolatile Organics (ug/Kg)</i>				
4-Methylphenol	31 - 31	1 / 27	4%	NA
Isophorone	880 - 880	1 / 27	4%	8,000
Naphthalene	31 - 13,000	8 / 27	30%	84,000
2-Methylnaphthalene	35 - 7,300	6 / 27	22%	NA
2,4-Dinitrotoluene	0 - 0	0 / 27	0%	0.8
Diethylphthalate	21 - 1,800	12 / 27	44%	470,000
Fluorene	0 - 0	0 / 27	0%	560,000
Phenanthrene	35 - 43	2 / 27	7%	NA
Anthracene	43 - 43	1 / 27	4%	12,000,000
Di-n-Butylphthalate	28 - 1,700	22 / 27	81%	2,300,000
Fluoranthene	22 - 22	1 / 27	4%	4,300,000
Pyrene	24 - 24	1 / 27	4%	4,200,000
bis(2-Ethylhexyl)Phthalate	44 - 630	20 / 27	74%	3,600,000
Di-n-Octyl Phthalate	22 - 29	3 / 27	11%	1,000,000
<i>Pesticides & PCBs (ug/Kg)</i>				
alpha-BHC	0.28 - 0.28	1 / 27	4%	NA
gamma-BHC (Lindane)	0.68 - 0.68	1 / 27	4%	NA
Heptachlor	0.13 - 0.13	1 / 27	4%	23,000
Aldrin	15 - 15	1 / 27	4%	500
Heptachlor epoxide	2.8 - 2.8	1 / 27	4%	700
Dieldrin	2.1 - 2.1	1 / 27	4%	4
4,4'-DDE	0.35 - 12	2 / 27	7%	54,000
Endosulfan II	6.2 - 6.2	1 / 27	4%	18,000
4,4'-DDD	1 - 1	1 / 27	4%	16,000
Endosulfan sulfate	0.33 - 0.33	1 / 27	4%	18 (3)
4,4'-DDT	4 - 4	1 / 27	4%	32,000
Methoxychlor	4.4 - 33	2 / 27	7%	160,000
Endrin aldehyde	1.7 - 1.7	1 / 27	4%	1,000
alpha-Chlordane	9.8 - 9.8	1 / 27	4%	10,000
gamma-Chlordane	1.3 - 1.3	1 / 27	4%	10,000
Aroclor-1232	250 - 490	2 / 27	7%	NA
Aroclor-1242	21 - 170	4 / 27	15%	NA
Aroclor-1254	5.6 - 2,500	8 / 27	30%	NA
Aroclor-1260	58 - 58	1 / 27	4%	NA

Notes:

NA = Criterion not available.

(1) **Italicized** values exceed groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.

(2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Ap Soil Remediation Objectives for Residential Properties.

(3) Standard for endosulfan used for endosulfan sulfate.

Table 9

S.E. Rockford Source Area Risk Assessment - Area 9/10 Subsurface Soil: Below 10 Feet

Parameter	Subsurface Soil - Area 9/10			
	Range of Detected Concentrations	Proportion of Samples With Detections		Soil Component of GW Ingestion Route Value
<i>Volatile Organics (ug/Kg)</i>				
<i>Methylene Chloride</i>	3 - 48	21 / 89	(24%)	20
Acetone	2 - 11	14 / 89	(16%)	16,000
1,1-Dichloroethene	2 - 2	1 / 89	(1%)	60
1,2-Dichloroethene (total)	5 - 86	2 / 89	(2%)	400
2-Butanone	4 - 10	5 / 89	(6%)	NA
1,1,1-Trichloroethane	1 - 50	4 / 89	(4%)	2,000
Trichloroethene	1 - 2	4 / 89	(4%)	60
1,1,2-Trichloroethane	6 - 6	1 / 89	(1%)	20
Tetrachloroethene	2 - 46	7 / 89	(8%)	60
Toluene	1 - 18	16 / 89	(18%)	12,000
Xylene	4 - 4	1 / 89	(1%)	200,000
<i>Semivolatile Organics (ug/Kg)</i>				
Naphthalene	420 - 420	1 / 24	(4%)	84,000
2-Methylnaphthalene	300 - 300	1 / 24	(4%)	NA
Acenaphthene	220 - 220	1 / 24	(4%)	570,000
Dibenzofuran	150 - 150	1 / 24	(4%)	NA
Fluorene	120 - 120	1 / 24	(4%)	560,000
Phenanthrene	0 - 0	0 / 24	(0%)	NA
Anthracene	0 - 0	0 / 24	(0%)	12,000,000
Carbazole	0 - 0	0 / 24	(0%)	600
Di-n-Butylphthalate	0 - 0	0 / 24	(0%)	2,300,000
Fluoranthene	0 - 0	0 / 24	(0%)	4,300,000
Pyrene	0 - 0	0 / 24	(0%)	4,200,000
Butylbenzylphthalate	0 - 0	0 / 24	(0%)	930,000
Benzo(a)anthracene	0 - 0	0 / 24	(0%)	2,000
Chrysene	0 - 0	0 / 24	(0%)	160,000
bis(2-Ethylhexyl)Phthalate	44 - 6,900	5 / 24	(21%)	3,600,000
Benzo (b) Fluoranthene	0 - 0	0 / 24	(0%)	5,000
Benzo (k) Fluoranthene	0 - 0	0 / 24	(0%)	49,000
Benzo (a) Pyrene	0 - 0	0 / 24	(0%)	8,000
Ideno (1,2,3-cd) Pyrene	0 - 0	0 / 24	(0%)	14,000
Benzo (g,h,i) Perylene	0 - 0	0 / 24	(0%)	NA
<i>Pesticides & PCBs (ug/Kg)</i>				
gamma-BHC (Lindane)	2.3 - 2.3	1 / 24	(4%)	NA
Heptachlor epoxide	0 - 0	0 / 24	(0%)	700
Dieldrin	0 - 0	0 / 24	(0%)	4
4,4'-DDE	0 - 0	0 / 24	(0%)	54,000
Endrin	3.8 - 3.8	1 / 24	(4%)	1,000
4,4'-DDD	0 - 0	0 / 24	(0%)	16,000
4,4'-DDT	6.4 - 6.4	1 / 24	(4%)	32,000
gamma-Chlordane	0 - 0	0 / 24	(0%)	10,000
Aroclor-1254	0 - 0	0 / 24	(0%)	NA

Notes:

NA = Criterion not available.

(1) ***Bold italicized*** values exceed groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.

(2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table Soil Remediation Objectives for Residential Properties.

Table 10

S.E. Rockford Source Area Risk Assessment - Area 11 Subsurface Soil: Below 10 Feet

Parameter	Subsurface Soil - Area 11			
	Range of Detected Concentrations	Proportion of Samples With Detections		Soil Component of GW Ingestion Route Value
<u>Volatile Organics (ug/Kg)</u>				
<i>Methylene Chloride</i>	1 - <i>2,900</i>	10 / 52	(19%)	20
Acetone	2 - 5,100	13 / 52	(25%)	16,000
Carbon Disulfide	1 - 3	4 / 52	(8%)	32,000
2-Butanone	4 - 4	1 / 52	(2%)	NA
1,1,1-Trichloroethane	2 - 4	3 / 52	(6%)	2,000
<i>Trichloroethene</i>	410 - <i>410</i>	1 / 52	(2%)	60
<i>Benzene</i>	5 - <i>1,500</i>	2 / 52	(4%)	30
Tetrachloroethene	1 - 46	3 / 52	(6%)	60
<i>Toluene</i>	1 - <i>1,400,000</i>	16 / 52	(31%)	12,000
<i>Ethylbenzene</i>	2 - <i>590,000</i>	9 / 52	(17%)	13,000
<i>Xylene</i>	1 - <i>2,300,000</i>	16 / 52	(31%)	200,000
<u>Semivolatile Organics (ug/Kg)</u>				
<i>2-Methylphenol</i>	60 - <i>580</i>	7 / 19	(37%)	15
4-Methylphenol	61 - 640	5 / 19	(26%)	NA
Isophorone	100 - 1,400	2 / 19	(11%)	8,000
2-Nitrophenol	1,100 - 1,100	1 / 19	(5%)	NA
bis(2-Chloroethoxy)Methane	230 - 230	1 / 19	(5%)	NA
Naphthalene	80 - 1,900	5 / 19	(26%)	84,000
2-Methylnaphthalene	52 - 140	5 / 19	(26%)	NA
Phenanthrene	16 - 47	3 / 19	(16%)	NA
Anthracene	45 - 45	1 / 19	(5%)	12,000,000
Di-n-Butylphthalate	510 - 510	1 / 19	(5%)	2,300,000
Fluoranthene	49 - 49	1 / 19	(5%)	4,300,000
Pyrene	63 - 63	1 / 19	(5%)	4,200,000
bis(2-Ethylhexyl)Phthalate	110 - 1,300	6 / 19	(32%)	3,600,000
Di-n-Octyl Phthalate	45 - 260	3 / 19	(16%)	10,000,000
<u>Pesticides & PCBs (ug/Kg)</u>				
alpha-BHC	0.23 - 0.96	3 / 19	(16%)	NA
gamma-BHC (Lindane)	0.18 - 0.18	1 / 19	(5%)	NA
Aldrin	0.29 - 0.29	1 / 19	(5%)	500
4,4'-DDE	0.26 - 0.68	3 / 19	(16%)	54,000
Endosulfan II	0.34 - 0.34	1 / 19	(5%)	18,000
4,4'-DDD	0.29 - 0.29	1 / 19	(5%)	16,000
4,4'-DDT	0.3 - 0.56	4 / 19	(21%)	32,000
Endrin aldehyde	0.49 - 0.49	1 / 19	(5%)	1,000 (3)
alpha-Chlordane	0.18 - 0.18	1 / 19	(5%)	10,000 (4)

Notes:

NA = Criterion not available.

- (1) ***Bold italicized*** values exceed human health criterion or groundwater protection criterion. Chemicals will be further evaluated in Tier 1 Phase 2 or Tier 3.
- (2) Values were compared to the Illinois Register, Title 35, Subtitle G, Chapter I, Subchapter f, Part 742. (1) Appendix B, Table A: Tier 1 Soil Remediation Objectives for Residential Properties.
- (3) Standard for endrin used for endrin aldehyde.
- (4) Standard for chlordane used for alpha chlordane.

ten feet were compared to the Tier 1 SCGV only. Chemicals that exceeded a value are shown in bold and italics.

Comparison of Inorganic Data to State-wide Background

Chemicals that exceeded either an ERSVs or SCGVs were compared to background concentrations. Figures 3 through 6 present the background soil sample locations for the four areas of concern. The SCGVs for inorganics are given in units of mg/L and are intended for comparison to Toxic Contaminant Leachate Procedure (TCLP) data. These data were not collected for inorganics at the SCOU. All inorganics chemical concentrations were compared to background concentrations. Maximum concentrations of detected inorganic chemicals were compared to background concentrations for inorganics derived from TACO Appendix A, Table G: Concentrations of Inorganic Chemicals in Background Soils. Concentrations for counties within metropolitan statistical areas were used.

Maximum concentrations of one inorganic, beryllium, was above the state-wide background concentrations identified in TACO. Therefore, concentrations of beryllium were then compared to site-specific background to see if the maximum concentration was significantly different from background levels found in the area.

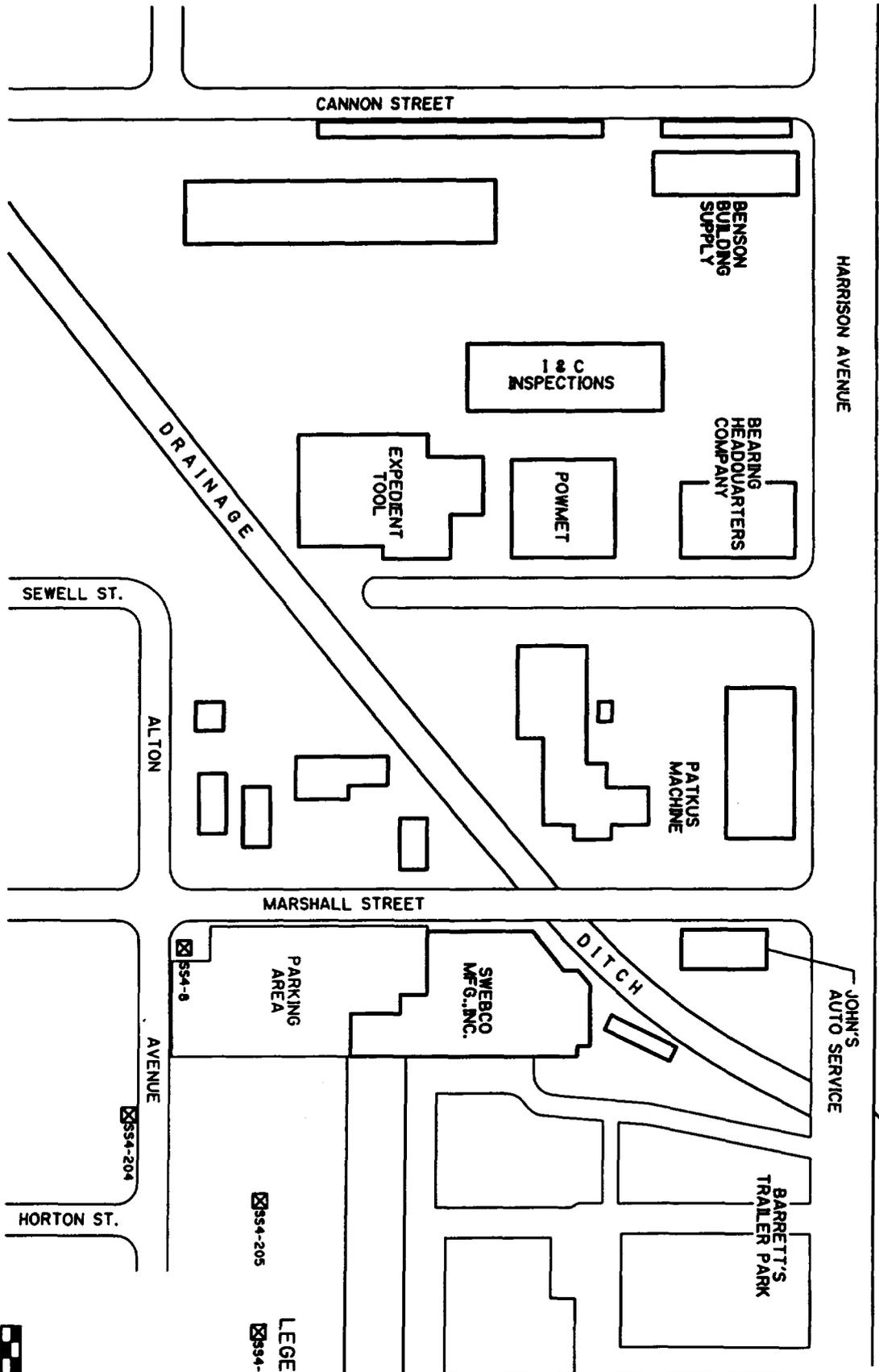
Comparison of Inorganic Data to Site-Specific Background

Site-specific background samples were identified by Illinois EPA staff and consisted of twelve samples from areas 4, 7 and 9/10. Site-specific background data were used to evaluate beryllium which exceeded a TACO background concentration.

Illinois EPA used the Shapiro-Wilk test to evaluate the site-specific background data to determine which statistical methods would be appropriate for analyzing the data. Use of the Shapiro-Wilk test in this fashion is prescribed in 742.410(b) of the TACO regulations. The results of the Shapiro-Wilk test indicated that both the on-site beryllium data and the site-specific background data for beryllium were lognormally distributed. Because the beryllium site-specific background data set was lognormally distributed and contained greater than 10 samples with less than 15% non-detects, the TACO regulations suggest calculating an Upper Tolerance Limit (UTL) for the data. In consideration of the site-specific background data, UTL values provide a higher level of confidence that the newly calculated background value is representative of the site. UTL values were calculated for the log transformed site-specific background data for beryllium. The on-site beryllium data were then compared to the UTL values established for the site-specific background data set. None of the site data exceeded the UTL for beryllium which means that beryllium is not found at the site at levels considered to be above background.

Comparison of Organic Data to Site-Specific Background

The same background data set used for metals was used to evaluate SVOCs. A 95% Upper Confidence Limit (UCL) was calculated for concentrations of organic compounds detected within the site-specific background data set. Similar to the



SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT

AREA 4 BACKGROUND SOIL SAMPLE LOCATIONS FOR PNA AND INORGANIC ANALYTES

LEGEND:
 ☒SS4-205 SURFACE SOIL SAMPLE LOCATION
 ☒SS4-204
 ☒SS4-8

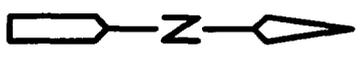
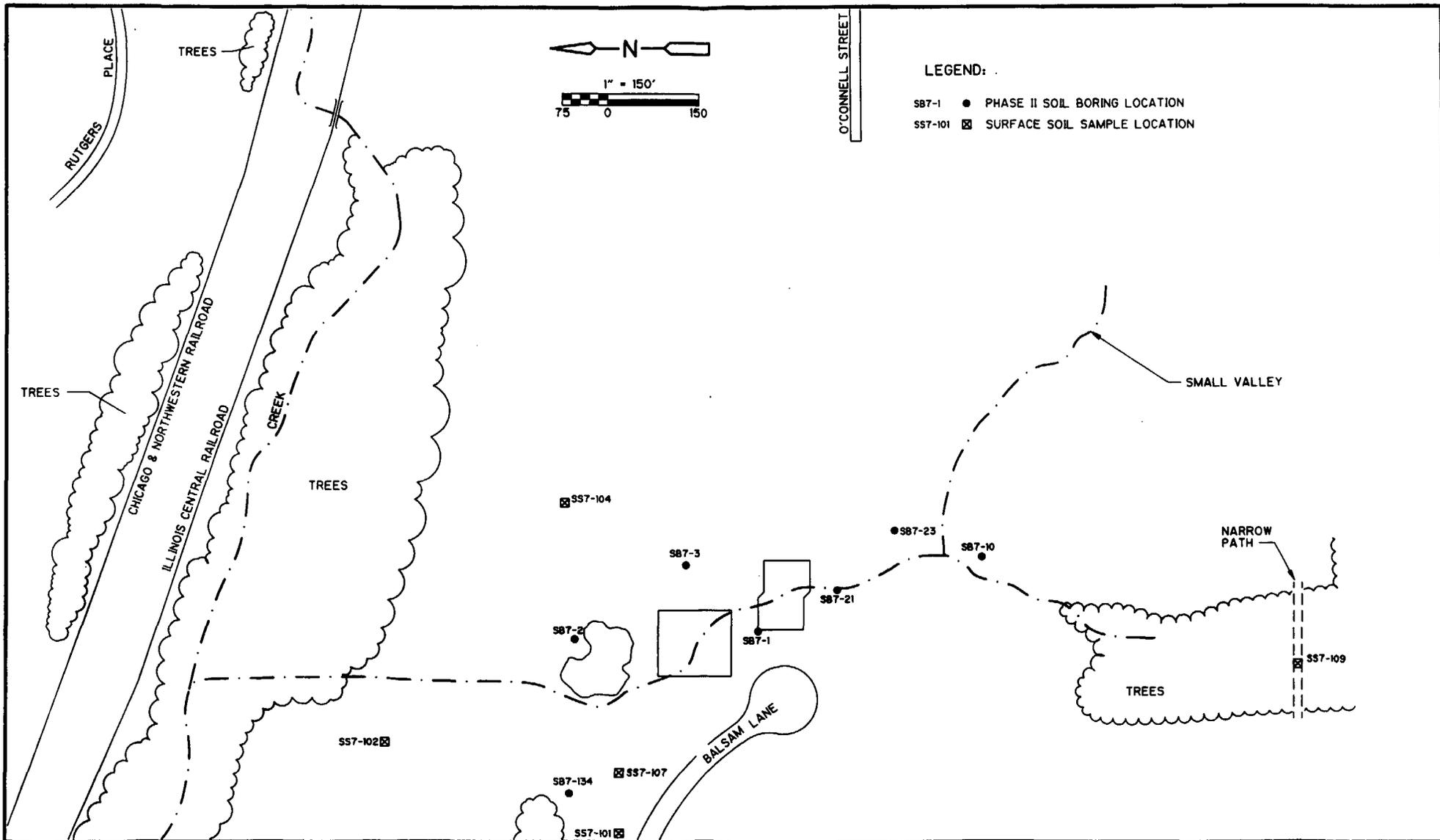
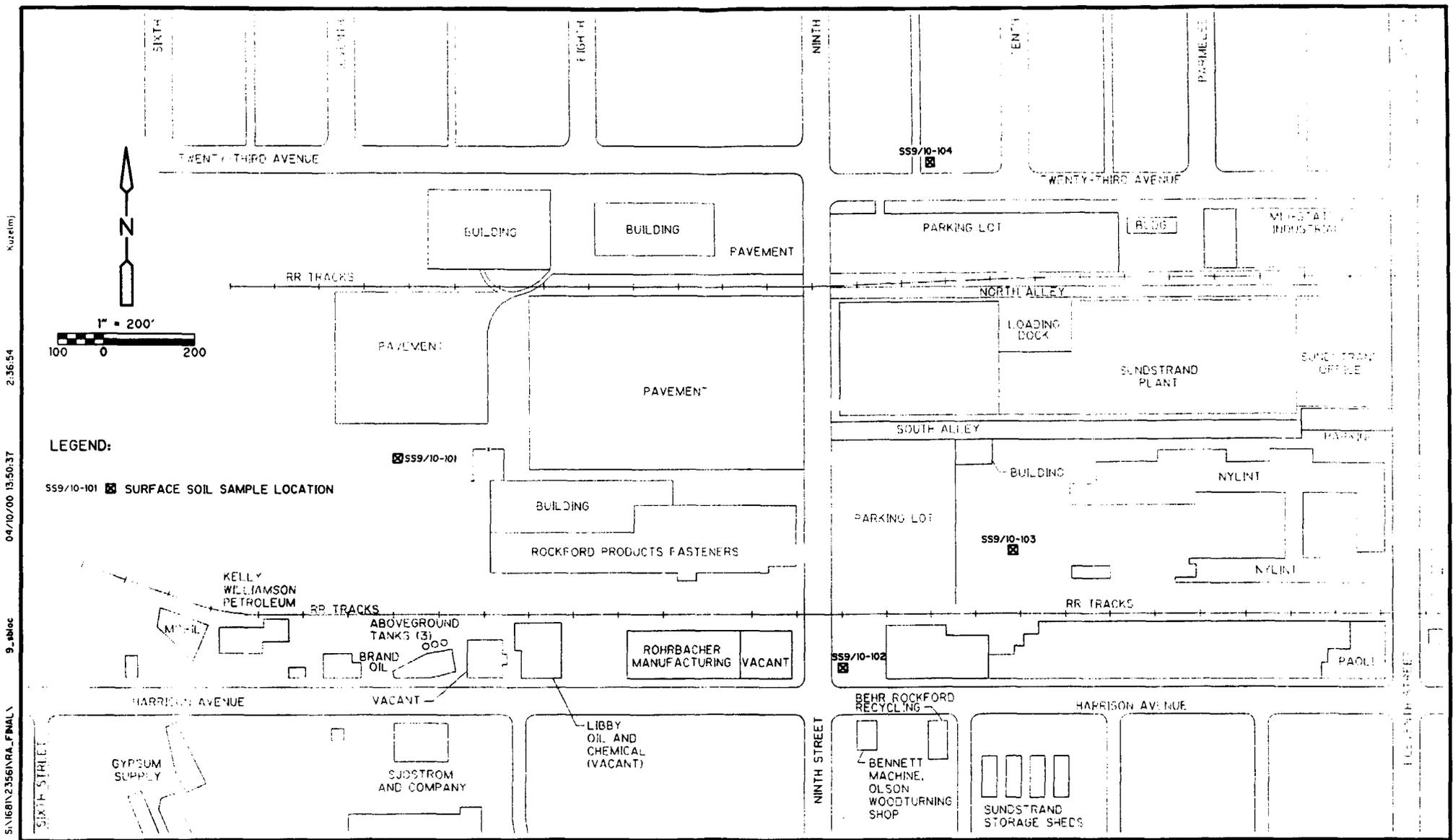


Figure No. 3

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SA\8812356\RA_FINAL\ TL_BACKG 04/10/00 13:53:39 2:51:37 Kuzelmj

NYLINT

PAOLI

ELEVENTH STREET

HARRISON AVENUE

PARKING

LOT

ROHR MANUFACTURING
(FORMERLY ROCKWELL GRAPHICS SYSTEMS)

DUMPSTER

VILLA
DA ROMA
RESTAURANT

FORMERLY
ROCKFORD
VARNISH

UNITED
STRUCTURES
(FORMERLY
ROCKFORD
COATINGS)

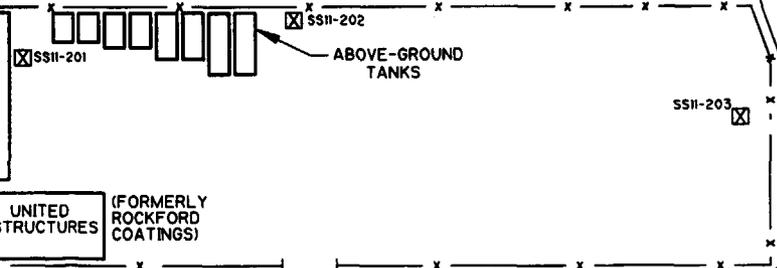
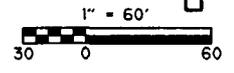
ABOVE-GROUND
TANKS

PARKING

LOT

LEGEND:

☒ SSII-201 SURFACE SOIL SAMPLE LOCATION



SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
AREA II BACKGROUND SOIL SAMPLE LOCATIONS
FOR PNA AND INORGANIC ANALYTES

Figure No. 6

Upper Tolerance Limit, calculating a UCL for the site-specific background data provides values with a higher level of confidence that the newly calculated background value is representative of the site. The maximum concentrations detected at the site were then compared to the UCL background values. Table 11 presents this comparison. The UCL background values are also included in Tables 1-4 for comparison purposes. Table 12 summarizes the comparisons made in tables 1-4. Maximum concentrations of SVOCs in Area 7 were below calculated UCL background concentrations and were therefore dropped from consideration as contaminants of concern in this area. SVOCs in Areas 4, 9/10, and 11 exceeded background and therefore could not be dropped from further evaluation. Maximum concentrations of SVOCs in Area 7 were below calculated UCL background concentrations and were dropped from further evaluation. Maximum concentrations of two SVOCs in area 11, 2-methynaphthalene and dibenzo (a,h) anthracene, were below background concentrations. 2-Methylnaphthalene was below background in area 9/10 and naphthalene, 2-methylnaphthalene and benzo (g,h,i) perylene were below background in area 4. These SVOCs were dropped from further evaluation. All other SVOCs exceeded background, and therefore could not be dropped from further evaluation.

Tables 12 through 14 summarize the results of comparisons made in Tables 1-10 as well as the four exclusion criteria described below. Chemicals that were not excluded by these criteria for the direct contact pathway were carried into the Tier 1 -Phase 2 analysis. Chemicals that were not excluded by these criteria for the protection of groundwater were carried into tier 3 analysis.

Exclusion Criteria	
1.	Maximum concentrations below TACO or site-specific background.
2.	Inorganics detected at concentrations found not to be significantly different than site-specific background concentrations.
3.	For the soil to groundwater route only - chemicals detected at low frequency of detection in soil or not detected in groundwater; and
4.	Maximum concentrations below the PQL.

In summary, in the Tier 1-Phase 1 analysis, site concentrations for each chemical were compared to TACO Tier ERSVs (direct contact) and SCGVs (protection of groundwater). This comparison is shown within Tables 1 through 10. As described previously, chemicals that exceeded a TACO Tier 1 value were excluded from further evaluation using the four exclusion criteria.

Table 11

Comparison of Maximum Concentrations of Site Data with Background Data for SVOCs

Southeast Rockford - Source Control Operable Unit Risk Assessment

Analytes	Background (ug/kg)	Area 11 (ug/kg)	Area 9/10 (ug/kg)	Area 7 (ug/kg)	Area 4 (ug/kg)
Naphthalene	296.5	15,000	320	-	260
2-Methylnaphthalene	296.5	45	250	-	120
Acenaphthene	296.5	39,000	350	-	960
Fluorene	296.5	47,000	340	-	920
Phenanthrene	446.4	370,000	3,600	-	16,000
Anthracene	194.5	93,000	640	-	1,000
Fluoranthene	808.8	440,000	4,800	42	12,000
Pyrene	670.0	430,000	4,200	37	5,000
Benzo(a)anthracene	401.1	200,000	2,300	-	5,600
Chrysene	431.2	240,000	2,100	-	5,900
Benzo (b) Fluoranthene	538.8	220,000	2,800	-	11,000
Benzo (k) Fluoranthene	301.2	130,000	890	-	11,000
Benzo (a) Pyrene	389.0	150,000	1,700	170	1,100
Indeno (1,2,3-cd) Pyrene	316.7	120,000	1,300	-	620
Dibenzo (a,h) Anthracene	296.5	70	-	-	430
Benzo (g,h,i) Perylene	329.3	120,000	1,400	-	70

Notes:

Bold and Italicized concentrations exceed background levels.

Table 12

Tier 1 Exceedances and Selection of Chemicals of Concern for Surface Soil
 Southeast Rockford - Source Control Operable Unit Risk Assessment

AREA	Exceedance			Selected Chemicals of Concern		Reason for Exclusion	
	Direct Contact	Soil to GW	Background	Direct Contact	Soil to GW	Direct Contact	Soil to GW
Area 4 (Residential)							
Carbazole		X			no		Not GW Contaminant
Benzo (a) anthracene	X	X	X	yes	no		Not GW Contaminant
Benzo (b) Fluoranthene	X	X	X	yes	no		Not GW Contaminant
Benzo (k) Fluoranthene	X		X	yes			
Benzo (a) Pyrene	X		X	yes			
Dibenzo (a,h) Anthracene	X		X	no		Below PQL	
Arsenic	X			no		Below Background	
Beryllium	X			no		Below Background	
Area 7 (Residential)							
Methylene Chloride		X			yes		
Tetrachloroethene		X			yes		
Benzo (a) Pyrene	X			no		Below Background and PQL	
Dieldrin		X			no		Not GW Contaminant
Arsenic	X			no		Below Background	
Beryllium	X			no		Below Background	
Area 9/10 (Residential)							
Benzo (a) anthracene	X	X		yes	no		Not GW Contaminant
Benzo (a) Pyrene	X			yes			
Benzo (b) Fluoranthene	X			yes			
Indeno (1,2,3,-cd) Pyrene	X			yes			
Dieldrin	X	X		yes	no		Not GW Contaminant
Arsenic	X			no		Below Background	
Beryllium	X			no		Below Background	
Area 11 (Residential)							
Carbazole	X	X		yes	no		Not GW Contaminant
Benzo (a) anthracene	X	X		yes	no		Not GW Contaminant
Chrysene	X	X		yes	no		Not GW Contaminant
Benzo (b) Fluoranthene	X	X		yes	no		Not GW Contaminant
Benzo (k) Fluoranthene	X	X		yes	no		Not GW Contaminant
Benzo (a) Pyrene	X	X		yes	no		Not GW Contaminant
Indeno (1,2,3-cd) Pyrene	X	X		yes	no		Not GW Contaminant
Dieldrin		X			no		Not GW Contaminant
Arsenic	X			no		Below Background	
Beryllium	X			no		Below Background	

Table 13

Tier 1 Exceedances and Selection of Chemicals of Concern for Subsurface Soil: Above 10 Feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

AREA	Exceedance		Selected Chemicals of Concern		Reason for Exclusion	
	Direct Contact	Soil to GW	Direct Contact	Soil to GW	Direct Contact	Soil to GW
Area 7 (Residential)						
1,2-Dichloroethene		X		yes		
1,1,1-Trichloroethane		X		yes		
Trichloroethene		X		yes		
Tetrachloroethene		X		yes		
Toluene		X		yes		
Ethylbenzene		X		yes		
Xylene		X		yes		
2,4-Dinitrotoluene	X	X	no	no	(1)	(1)

Notes:

(1) More data needed to verify whether chemical of concern. To be addressed in Feasibility Study.

Table 14
Tier 1 Exceedances and Selection of Chemicals of Concern for Subsurface Soil: Below 10 Feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

AREA	Exceedance		Selected Chemicals of Concern		Reason for Exclusion	
	Direct Contact	Soil to GW	Direct Contact	Soil to GW	Direct Contact	Soil to GW
Area 4 (Residential) 1,1,1 - Trichloroethane		X		yes		
Area 7 (Residential) 1,2-Dichloroethene (total) Chloroform 1,2-Dichloroethane 1,1,1-Trichloroethane Trichloroethene Benzene Tetrachloroethene Toluene Chlorobenzene Ethylbenzene		X X X X X X X X X X		yes no yes yes yes no yes yes no yes		(1) (1) (1)
Area 9/10 (Residential) Methylene Chloride		X		yes		
Area 11 (Residential) Methylene Chloride Trichloroethene Benzene Toluene Ethylbenzene Xylene 2-Methylphenol		X X X X X X X		yes yes yes yes yes yes yes		

Notes:

(1) Frequency of detection <5%, not detected in groundwater.

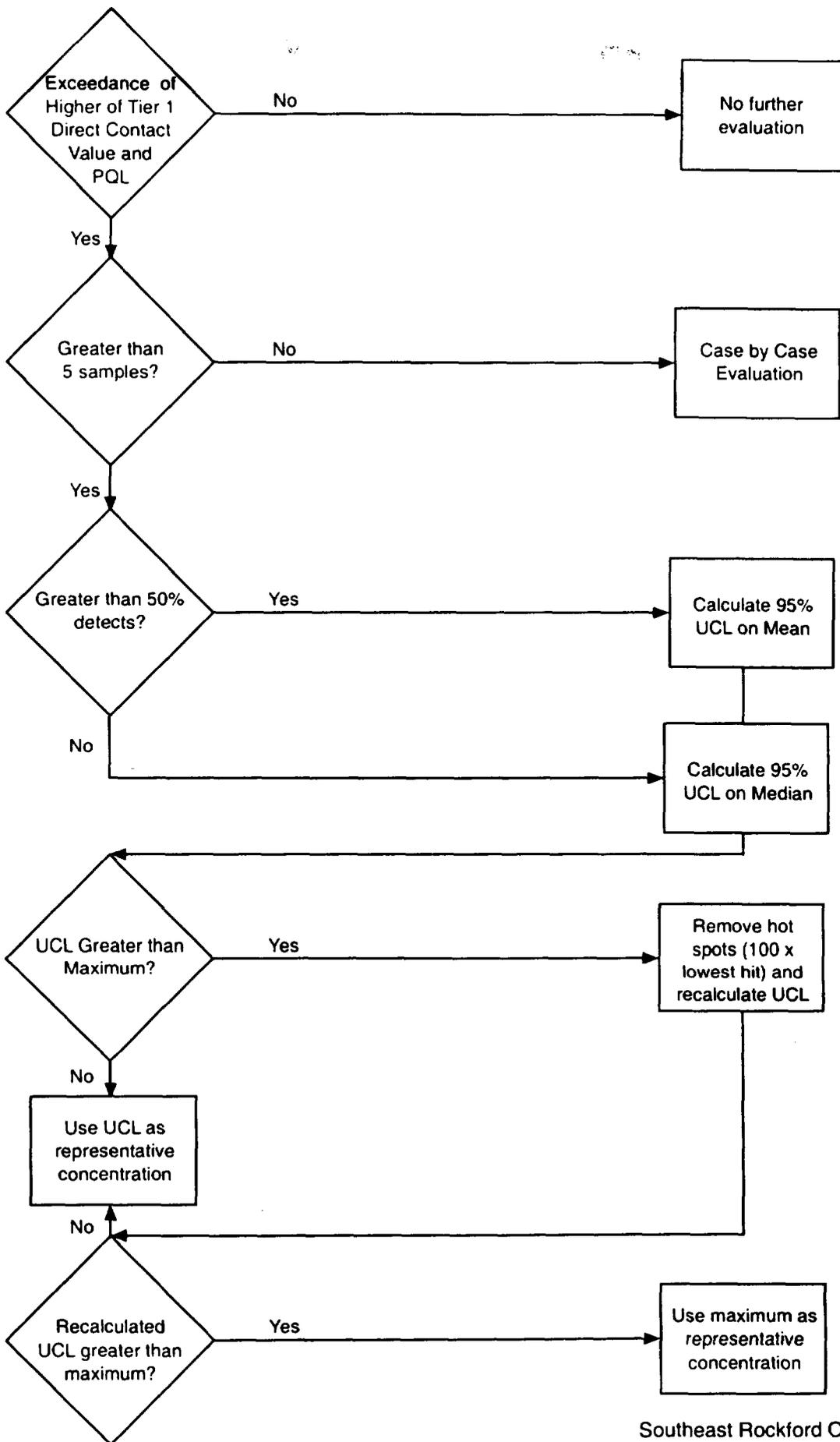
3.2 Tier 1 -Phase 2

For chemicals that exceeded an ERSV and background concentrations (if available), the second phase of evaluation for the direct contact pathway involved the following steps

1. Calculate the 95% upper confidence limits (UCL) on the mean concentrations for chemicals that exceeded site-specific background and PQL.
2. Compare 95% UCLs to the higher of the Tier 1 concentrations or the practical quantitation limit (PQL) reported in SW-846 (Test Methods for Evaluating Solid Waste, Final Update, USEPA, December 1996).

Calculating 95% UCLs for those chemicals that exceeded an ERSV and background concentrations (if available) results in concentrations which are typically less conservative than maximum concentrations and more representative of an exposure point concentration than those used in Tier 1 -Phase 1. A procedure was developed for calculating the 95% UCL to accommodate conditions encountered among the datasets for the four different areas. Many of the detected concentrations were estimated values below the detection limits, ("J" values). This resulted in a large range of detected concentrations in areas that also had hot spots. For the purpose of the risk assessment, the term "hot spot" is defined as a specific location within one of the four areas of concern that contains concentrations which are two orders of magnitude above the lowest detected concentration within that area. In these areas, the value deviation for the data were large and resulted in 95% UCL values which exceeded maximum concentrations. For these areas, hot spots were removed from the data sets and UCLs were recalculated. Hot spots were later addressed in the feasibility study as areas of concern. Figure 7 presents the procedure for calculating 95% UCLs for PAHs.

A minimum of 5 samples were needed to calculate the 95% UCL. Chemicals with fewer than 5 samples were evaluated on a case by case basis. A minimum of 50% detections was needed to calculate the 95% UCL on the mean. If there were less than 50% detections, the 95% UCL on the median was calculated, as approved by Illinois EPA. In the event that a calculated, or recalculated (after removing hot spots) UCL exceeded a maximum concentration, the maximum concentration was used as the representative concentration for comparison to the higher of the Tier 1 value or the PQL. Table 15 presents the results of the 95% UCL evaluation. In areas 4 and 11, hot spots, where concentrations were two orders of magnitude greater than the lowest detected concentrations, were identified. These samples were removed from the data set and the 95% UCL was re-calculated. Hot spots were later addressed in the feasibility study for each of the four areas of concern. Following the removal of hot spots from the data sets, all remaining re-calculated concentrations were below the Tier 1 value or the PQL. In area 9, only four SVOC samples were available, not enough to calculate a 95% UCL. SVOCs in three of the four samples exceeded the



Southeast Rockford Operable Unit

Figure 7
Procedure for Calculating 95%
Upper Confidence Limits for SVOCs

Table 15
Results of the Tier 1 (Phase 2) 95% UCL Calculations for SVOCs
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 4	
Surface	3 hot spot samples (SS4-201, SS4-203, SS4-203D) addressed in FS All other hits below PQL or Tier 1 values
Subsurface (<10 ft)	No SVOC exceedances(1)
Subsurface (>10 ft)	No SVOC exceedances(1)
Area 7	
Surface	No SVOC exceedances(1)
Subsurface (<10 ft)	No SVOC exceedances(1)
Subsurface (>10 ft)	No SVOC exceedances(1)
Area 9/10	
Surface	3 out of 4 samples with exceedances (SS910-101, SS910-103, SS910-104) addressed in FS
Subsurface (<10 ft)	No samples
Subsurface (>10 ft)	No SVOC exceedances(1)
Area 11	
Surface	2 hot spots (SS11-206, SS11-207) addressed in FS
Subsurface (<10 ft)	No samples
Subsurface (>10 ft)	No SVOC exceedances(1)

(1) maximum concentrations of SVOCs did not exceed Tier 1 values and/or background concentrations, therefore, 95%UCLs not calculated.

higher of the Tier 1 value and the PQL. This information was used in the feasibility study to determine the need for further sampling or remediation.

3.3 Results of Tier 1 Assessment

The results of the assessment of the direct contact pathway can be summarized as follows:

1. Maximum concentrations of all VOCs were below their respective ERSVs and were dropped from further evaluation for the direct contact pathway.
2. Maximum concentrations of SVOC and inorganics exceeded their respective ERSV in all four areas.
3. Maximum concentrations of inorganics and one SVOC in area 7, benzo (a) pyrene, were dropped from further evaluation because detected concentrations were less than or consistent with background concentrations. Risk associated with these chemicals are below 1E-06 (one in one million) and/or a hazard index of 1.0.
4. Selected samples in Areas 4 (SS4-201, SS4-203, SS4-203D) and 11 (SS11-206, SS11-207) were identified as hot spots that exceeded Tier 1 values and PQLs for SVOCs. Three out of four samples in Area 9/10 (SS910-101, SS910-103, SS910-104) exceeded one or more PNA values. These data are presented in Appendix B. The hot spots in Areas 4 and 11 and the samples exceeding a PNA value in Area 9/10 will be addressed in the Feasibility Study. Additional data may be needed in the remedial design phase to better characterize risk and the extent of contamination. Based on the results of sampling, if necessary, remedial alternatives that address SVOCs would be developed and evaluated. The presence of these hot spots represents a potential exceedance of risk limits established by USEPA (a noncancer hazard index of 1.0 and cancer risks of between one in one million and one in one hundred thousand) and Illinois EPA (a noncancer index of 1.0 and cancer risks of one in one million used to develop the Tier 1 values) depending on actual exposure.

The results of the assessment of the soil to groundwater pathway can be summarized as follows:

1. Several chemicals were dropped from further evaluation for the soil to groundwater pathway because they were not detected in groundwater (Dieldrin, carbazole and several SVOCs).
2. VOCs in surface soil in area 4 and VOCs in subsurface soil in all four areas exceeded Tier 1 SCGV values. These VOCs were further evaluated in Tier 3.

Section 4

Tier 3 Assessment

A Tier 3 assessment was conducted for two pathways: (1) the soil component of the groundwater exposure route; and (2) ingestion of plants as part of an agricultural scenario.

4.1 Soil Component of the Groundwater Ingestion Pathway

A Tier 3 assessment was conducted for those chemicals that exceeded a SCGV and were detected in groundwater during past sampling events at greater than 5 percent frequency of detection. The Tier 3 assessment consisted of calculating soil concentration protective of groundwater at a designated point of compliance. The point of compliance is the boundary of the groundwater management zone (GMZ) established in each of the four areas. The GMZ is the area within which active remediation is underway.

Figure 2 presents the Tier 2 assessment process for the soil to groundwater pathway. TACO presents two models for calculating site-specific remediation objectives for the soil to groundwater pathway - the Soil Screening Level (SSL) Model and the Risk-Based Corrective Action (RBCA) Model. Only the RBCA model incorporates a component to address the dilution and attenuation that occurs in a GMZ, therefore, this was the model employed to calculate the Tier 3 concentrations.

The RBCA model incorporates site-specific information on the following variables:

- fraction of organic carbon (FOC)
- infiltration rate of water through soil
- hydraulic gradient
- hydraulic conductivity
- width of the source areas parallel to groundwater flow
- width of the source areas perpendicular to groundwater flow in the horizontal and vertical planes
- groundwater mixing zone thickness
- distance to boundary of groundwater management zone

The values used for these variables, as well as other default values used in the RBCA model, are presented in Appendix A. Equations R12 through R26, presented in Appendix C, Table C of TACO were used to calculate the Tier 3 concentrations. All of the variables used in these equations are defined in Table A-1 in Appendix A. Other key variables, including leaching factors, diffusion coefficients, saturation concentrations, and attenuation factors, are calculated and presented on Tables A-2 through A-5. The Tier 3 risk-based soil levels protective of groundwater are presented on Table 16 for the chemicals of concern. Tier 1 concentrations are also presented for comparative purposes. Except for one chemical (trichloroethene) in Area 11, all Tier 3 concentrations were greater than the Tier 1 concentrations. The saturation concentrations are also presented, and, according to TACO, the ultimate remediation objective is the lower of the calculated concentration and the saturation concentration. The saturation concentration is the lower of the two concentrations for several chemicals in Areas 7, 9/10 and 11. Two hot spots, or source areas were identified in Area 7 and three hot spots were identified in Area 9 /10, each at different distances from the edge of the groundwater management zone (GMZ) and with different source widths and source thicknesses. Figures 8 and 9 show the locations of the hot spots. The model used to calculate the SROs incorporates distance to the GMZ, source widths and thickness resulting in different degrees of attenuation between the source and an exposure point. For this reason, different SROs were calculated for each hot spot area associated with different degrees of attenuation (e.g. RBSLatten area 9/10c, RBSLatten area 9/10w). Areas 4 and 11 had only one hot spot. For this reason, only one set of remediation objectives was developed for areas 4 and 11. Tier 3 remediation objectives (or soil saturation concentrations, if lower) are compared to maximum detected concentrations. Per Taco 742.305(b), "no organic contaminant of concern may remain in the soil at concentrations which exceed the soil saturation limit". In Area 4, 1,1,1-TCA, the only chemical of concern, exceeds the SRO. In Area 7, cis-1,2-dichloroethene, tetrachloroethane, 1,1,1-trichloroethane, and trichloroethene exceed their respective SROs. In Area 11, benzene, ethyl- benzene, and trichloroethane exceed their respective SROs and toluene and xylene exceed their respective soil saturation concentrations.

Table 16
Risk-Based Soil Levels Protective of Groundwater for Each Area
Southeast Rockford Operable Unit

Comparison of Calculated Tier 3 Soil Remediation Objectives to Tier I (mg/kg)

Area 4	RBSLatten _{area4}	C ^s _{sat}	Residential Class I GW Tier I SRO	Maximum Detected Concentration
1,1,1-Trichloroethane	9.118	1084	2	510

Area 7	RBSLatten _{area7p}	RBSLatten _{area7d}	C ^s _{sat}	Residential Class I GW Tier I SRO	Maximum Detected Concentration
1,2-Dichloroethane	3.678	1787.000	1768	0.02	0.18
cis-1,2-Dichloroethene	0.941	11.500	1141	0.4	49
2,4-Dinitrotoluene	0.162	80.900	182	0.0008	1.5
Ethylbenzene	57.347	953.000	389	13	31
Methylene Chloride	1.15E+06	2.27E+12	2303	0.02	0.012
Tetrachloroethene	1.465	136	218	0.06	260
Toluene	337502367.730	3.74E+14	638	12	23
1,1,1-Trichloroethane	108.033	19622.000	1084	2	460
1,1,2-Trichloroethane	0.619	56.300	1784	0.02	0.46
Trichloroethene	0.310	7.200	1242	0.06	130
Xylenes (total)	34105.533	1.66E+07	312	150	210

Area 9/10	RBSLatten _{area9/10c}	RBSLatten _{area9/10w}	RBSLatten _{area9/10ns}	C ^s _{sat}	Residential Class I GW Tier I SRO	Maximum Detected Concentration
Methylene Chloride	3.26E+23	2.22E+12	4.13E+21	2303	0.02	0.048

Area 11	RBSLatten _{area11}	C ^s _{sat}	Residential Class I GW Tier I SRO	Maximum Detected Concentration
Benzene	0.189	824	0.03	1.5
Ethylbenzene	7.983	389	13	590
Methylene Chloride	4.79E+07	2303	0.02	2.9
2-Methylphenol	2.82E+23	16827	15	0.58
Toluene	1.06E+10	638	12	1400
Trichloroethene	0.051	1242	0.06	0.41
Xylenes (total)	24500.418	312	150	2,300

Notes:

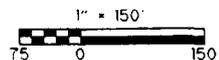
RBSLatten refers to the degree of attenuation associated with a particular source area as calculated using the equation R15 of TACO

C^s is the saturation concentration calculated using the equation S29 of TACO

SRO is the TACO Tier 1 soil remediation objective

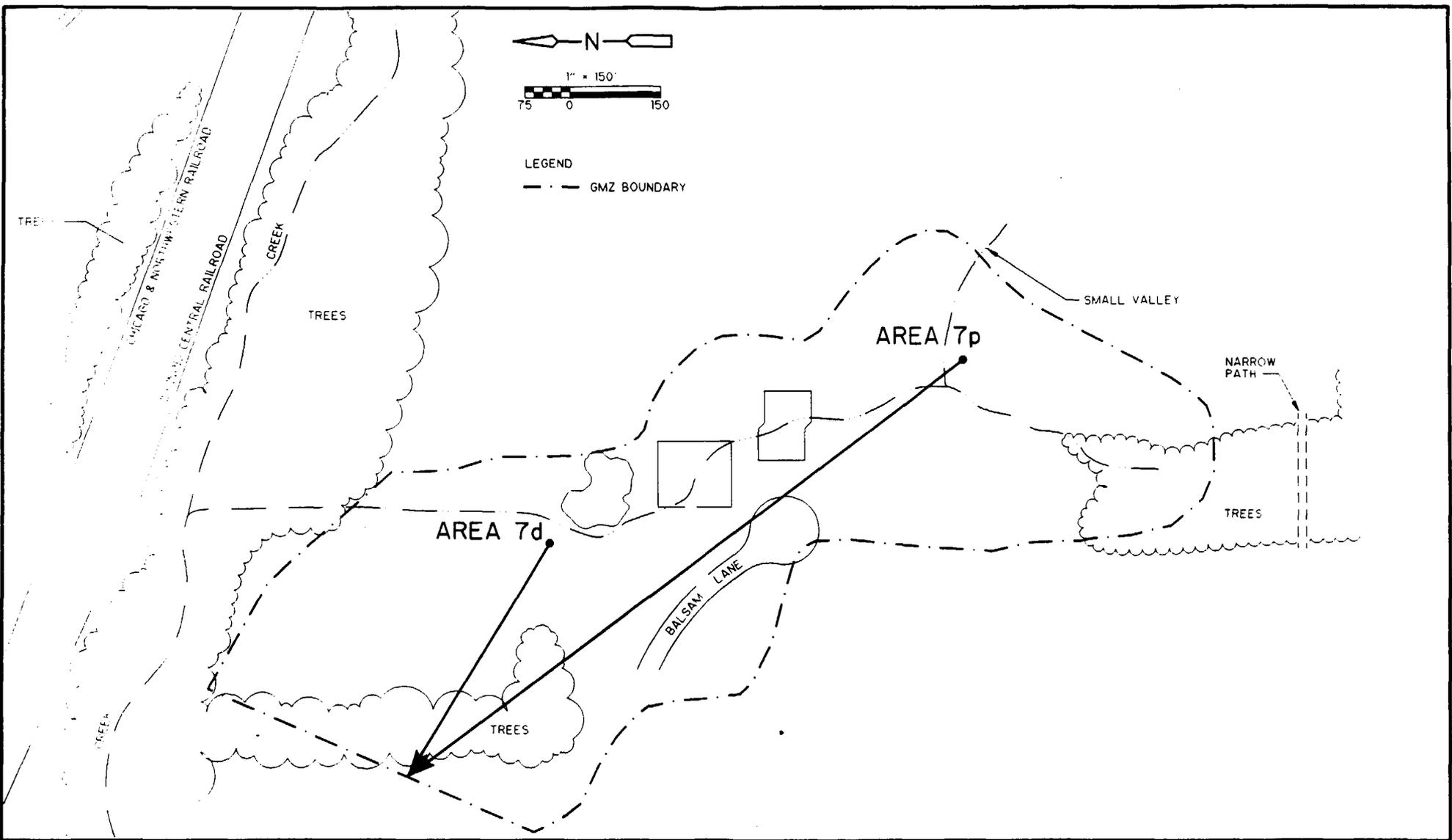
The ultimate soil remediation objective for the protection of groundwater is the lower of the RBSLatten concentration and the C^ssat value.

The exceptions are for ethylbenzene, trichloroethene, and total xylenes in Area 11, where the Residential Class 1 groundwater Tier 1 SRO is used instead



LEGEND

- - - GMZ BOUNDARY



SA188123561A.RA_FINAL

CDM
environmental engineers, scientists,
planners, & management consultants

FIGURE No. 8
SOUTHEAST ROCKFORD
SOURCE CONTROL OPERABLE UNIT
HOTS SPOTS IN AREA 7

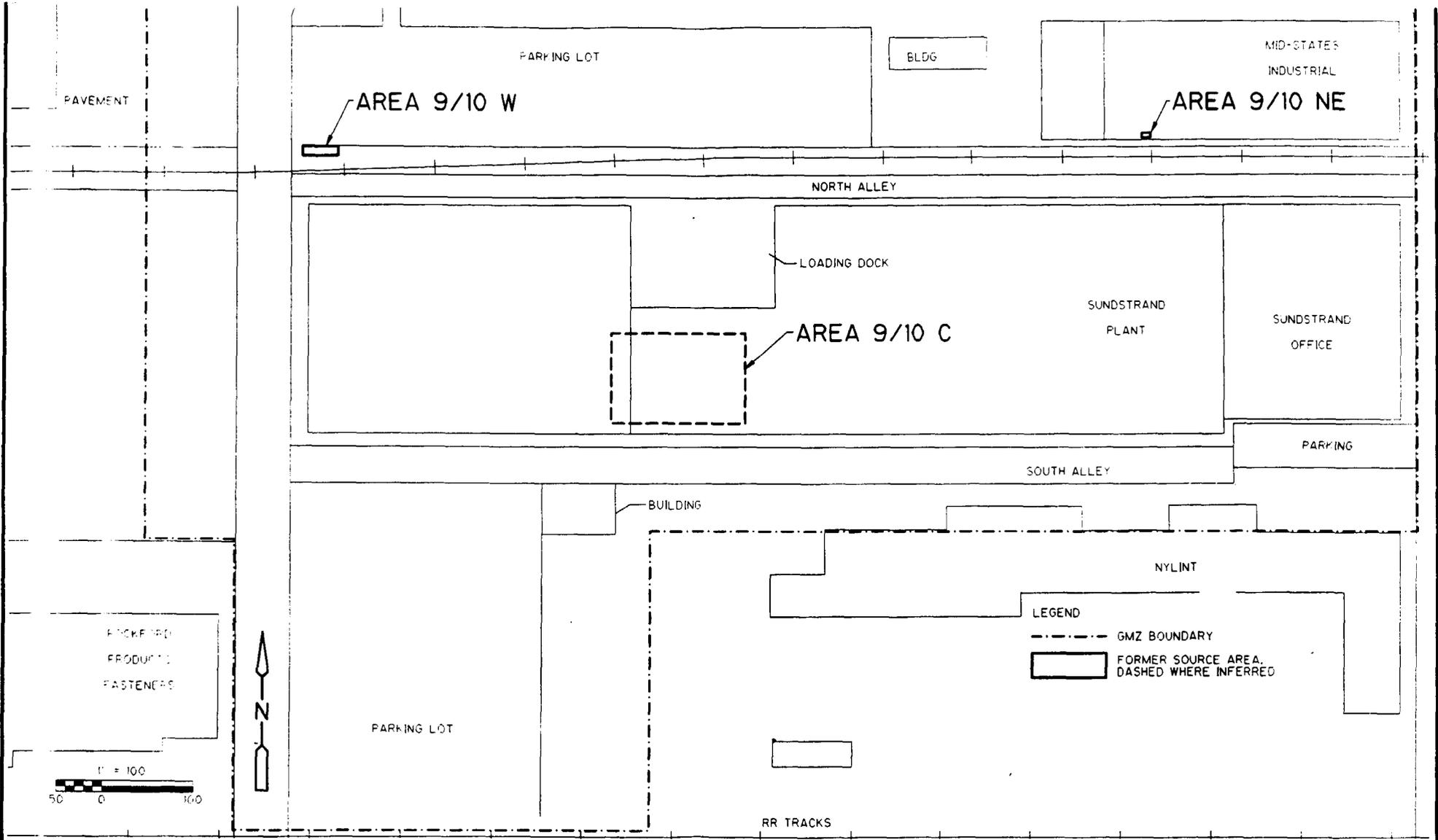


FIGURE No. 9
 SOUTHEAST ROCKFORD
 SOURCE CONTROL OPERABLE UNIT
HOT SPOTS IN AREA 9 / 10

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4.2 Vegetable Ingestion Pathway

Area 7 borders land currently used for agricultural purposes, and no current zoning restrictions prevent conversion of some of the undeveloped portions of Area 7 to agricultural use. For these reasons, a semi-quantitative evaluation was conducted to determine whether the use of Area 7 for growing vegetables or fruits would result in an unacceptable risk to human health. The use of this land for dairy farming was not considered due to the limited size of Area 7.

The qualitative evaluation of the potential agricultural pathway had the following steps:

1. Calculate a potential concentration in plants grown in Area 7 using soil-to-plant stem concentration factors;
2. Identify conservative plant ingestion rates and compare these rates to soil ingestion rates.
3. If ingestion rates are similar, compare plant concentrations to Tier 1 risk-based soil concentrations to determine whether risks are unacceptable.

Soil to plant stem concentrations factors are presented in Risk Assessment Handbook for the Massachusetts Military Reservation (Air National Guard, 1994). An estimated concentration in plants is obtained by multiplying the soil-to-plant concentration by the observed soil concentration as follows:

$$PC = (SCF_{soil}) (\text{mean soil concentrations})$$

where

PC = concentration in plant

SCF_{soil} = soil-to-plant stem concentration factor

(mg contaminant per gram dry plant/mg contaminant per gram dry soil)

Table 17 presents average soil concentrations, SCFs and estimated plant concentrations for chemicals of concern identified in Area 7.

Plant ingestion rates were obtained from Soil Screening Guidance: Technical Background Document (EPA, 1996). Estimated homegrown fresh weight consumption rates for above ground unprotected vegetables and below ground unprotected vegetables were given as 76 mg/day and 28 mg/day, respectively. To compare to the unitized soil ingestion rate of 114 (milligrams per year for each kilogram of bodyweight per day) used to develop the Tier 1 soil values which is based

Table 17
Comparison of Average Soil Concentrations, SCFs and Estimated Plant Concentrations for COCs
Southeast Rockford Operable Unit

Parameter	Range of Detected Concentrations in soil	Proportion of Samples With Detections	Average Soil Concentrations	SCF soil ug-kg plant/ug-kg soil	Average Concentration in Plant ug/kg	Residential Soil Objective (Lower of inh/ingest)
Volatiles Organics (ug/kg)						
Methylene Chloride	4 - 33	7 / 12 (58%)	14.7	25.000	367.86	13,000
Acetone	8 - 62	6 / 12 (50%)	22.8	8.800	196.37	7,800,000
1,1-Dichloroethane	8 - 8	1 / 12 (8%)	8.0	17.000	136.00	1,300,000
1,2-Dichloroethane (total)	220 - 220	1 / 12 (8%)	220.0	15.000	3300.00	780,000 (3)
1,2-Dichloroethane	7 - 8	2 / 12 (17%)	7.5	22.000	165.00	400
1,1,1-Trichloroethane	5 - 40	3 / 12 (25%)	18.3	7.200	132.00	1,200,000
Trichloroethane	4 - 140	2 / 12 (17%)	72.0	7.900	568.80	1,200,000
Tetrachloroethane	5 - 400	4 / 12 (33%)	121.8	2.000	243.50	11,000
1,1,2,2-Tetrachloroethane	12 - 12	1 / 12 (8%)	12.0	6.600	79.20	NA
Toluene	1 - 7	4 / 12 (33%)	3.8	5.300	19.88	650,000
Semivolatiles Organics (ug/kg)						
Isophorone	150 - 150	1 / 12 (8%)	150.0	NA	NA	4,600,000
Fluoranthene	42 - 42	1 / 12 (8%)	42.0	0.081	3.40	3,100,000
Pyrene	37 - 37	1 / 12 (8%)	37.0	0.024	0.89	2,300,000
bis(2-Ethylhexyl)Phthalate	46 - 570	12 / 12 (100%)	178.3	0.044	7.85	46,000
Benzo (a) Pyrene	170 - 170	1 / 12 (8%)	170.0	0.060	10.20	90
Pesticides & PCBs (ug/kg)						
Dieldrin	5.3 - 36	3 / 12 (25%)	21.4	0.100	2.14	40
4,4'-DDE	13 - 13	1 / 12 (8%)	13.0	0.100	1.30	2,000
Endosulfan II	15 - 15	1 / 12 (8%)	15.0	1.400	21.00	470,000
4,4'-DDT	5.8 - 35	3 / 12 (25%)	17.6	0.016	0.28	2,000
Endrin aldehyde	5.1 - 33	4 / 12 (33%)	13.7	NA	NA	23,000 (4)
gamma-Chlordane	20 - 20	1 / 12 (8%)	20.0	0.016	0.32	500
Aroclor-1260	450 - 450	1 / 12 (8%)	450.0	0.020	9.00	1,000
Inorganics (mg/kg)						
Aluminum	8,630 - 15,800	12 / 12 (100%)	12450.8	0.004	49.80	NA
Antimony	9.4 - 12.7	7 / 12 (58%)	11.2	0.200	2.23	31
Arsenic	3.6 - 6.8	12 / 12 (100%)	5.0	0.040	0.20	0.4
Barium	41.6 - 260	12 / 12 (100%)	104.4	0.150	15.66	5,500
Beryllium	0.13 - 0.66	12 / 12 (100%)	0.3	0.010	0.003	0.1
Cadmium	1.6 - 1.6	1 / 12 (8%)	1.6	0.550	0.88	78
Calcium	929 - 27,100	12 / 12 (100%)	6114.9	3.500	21402.21	NA
Chromium	10.1 - 55.1	12 / 12 (100%)	21.7	0.008	0.16	270
Cobalt	5.2 - 11.3	12 / 12 (100%)	6.6	0.020	0.13	4,700
Copper	7.6 - 148	12 / 12 (100%)	27.8	0.400	11.13	2,900
Iron	10,600 - 19,200	12 / 12 (100%)	14791.71	0.004	59.17	NA
Lead	9.7 - 217	12 / 12 (100%)	56.2	0.045	2.53	400
Magnesium	1,400 - 17,400	12 / 12 (100%)	4439.2	1.000	4439.17	NA
Manganese	292 - 698	12 / 12 (100%)	474.8	0.250	118.69	3,700
Mercury	0.06 - 2.2	3 / 12 (25%)	0.8	0.900	0.71	10
Nickel	7.3 - 49.1	12 / 12 (100%)	15.1	0.060	0.91	1,600
Potassium	800 - 1,550	12 / 12 (100%)	1156.5	1.000	1156.50	NA
Selenium	0.92 - 1.4	8 / 12 (67%)	1.1	0.025	0.03	390
Silver	1.4 - 1.4	1 / 12 (8%)	1.4	0.400	0.56	390
Sodium	26.7 - 178	12 / 12 (100%)	91.2	0.075	6.84	NA
Thallium	1.9 - 2.1	2 / 12 (17%)	2.0	0.004	0.01	6
Vanadium	19.2 - 36.4	12 / 12 (100%)	28.8	0.006	0.16	550
Zinc	31.3 - 177	12 / 12 (100%)	67.9	1.500	101.79	23,000
Cyanide	0.25 - 2.9	6 / 12 (50%)	0.7	18.000	13.26	1,600

on a 30 year exposure and a 70 kilogram adult, a total above and below ground home grown vegetable consumption rate of 104 mg/day was converted to 45 mg-yr./kg-day, using a 30 year exposure and a 70 kilogram adult. Because the unitized consumption rate for plants is lower than that for soil, it is assumed that the Tier 1 soil concentrations could be used as surrogate risk-based concentrations for plants. Table 17 presents a comparison of estimated plant concentrations to Tier 1 soil concentrations. There are no exceedances.

Based on this evaluation, it is concluded that ingestion of vegetables (or fruits which have a fresh weight consumption rate lower than vegetables, i.e., 88 mg/day) would not result in exceedance of either a hazard index of 1.0 or a cancer risk of 1E-06 (one in one million), which are the risk limits on which the Tier 1 values are based.

4.3 Results of Tier 3 Assessment

The results of the assessment of the soil component of the groundwater ingestion pathway can be summarized as follows:

1. In Area 4, 1, 1, 1-trichloroethane, exceeded its soil remediation objective. In area 7, cis-1, 2-dichloroethene, 2,4-dinitrotoluene, tetrachlorene, 1,1,1-trichlorethane, trichlorethene, and total xylenes exceeded either their respective soil remediation objective or the soil saturation limit. In Area 11, benzene, ethylbenze, toluene, trichloroethene, and total xylenes exceeded either their soil remediation objective or soil saturation limit. Risks associated with these chemicals in each area of concern exceed cancer risk limits of one in one million or a hazard index of 1.0.
2. All areas where detected chemical concentrations exceeded the lower of the SRO or saturation concentration were further evaluated in the Feasibility Study. Volumes estimates were developed for these areas for excavation or remediation purposes.

Chemical data in Illinois Environmental Protection Agency (Illinois EPA) project files indicate significantly high PCE concentrations in the former outdoor drum storage area located in the west part of the property now occupied by Sundstrand Corporation Plant #1 (2421 11th Street). These data were not included as part of this risk assessment. This area is referred to as Area 9/10_w in this risk assessment and in the Focused Feasibility Study (FFS). PCE soil concentrations in Area 9/10_w significantly exceeded the Tier 3 cleanup objective of 43.5 mg/kg. Concentration contours indicate that between zero and five feet below ground surface, a hot spot area covering approximately 350 to 400 square feet exceeds the Tier 3 cleanup objective for PCE. The highest analyzed concentrations within the hot spot ranged from 47 to 3,500 mg/kg PCE. Contaminated soil within Area 9/10_w is addressed by the soil remedial alternatives in the FFS.

The results of the assessment of the vegetable ingestion pathway can be summarized as follows:

Chemical-Specific Concern Risk in Each Area				
	Areas			
Chemical	4	7	9/10	11
1,2-DCA	1.3E-05	1.3E-05	1.3E-05	1.3E-05
PCE	7.0E-06	7.0E-06	7.0E-06	7.0E-06
Benzene				1.0E-06
Methylene chloride	1.0E-06	1.0E-06	1.0E-06	1.0E-06
1,1,2-TA	1.0E-06	1.0E-06	1.0E-06	1.0E-06
TCE	1.0E-06	1.0E-06	1.0E-06	1.0E-06
Total Cancer Risk	2.3E-05	2.3E-05	2.3E-05	2.3E-05

The total cancer risk if all the SROs were achieved is determined by adding the cancer risk associated with the GROs for all carcinogenic chemicals of concern in a particular area. The highest total cancer risk is 2.4 in one hundred thousand (2.4E-05) in Area 11. Per TACO, total cancer risks associated with a mixture must be less than one in one hundred thousand (1.0E-04). If the SROs are achieved, cancer risks associated with the soil to groundwater exposure pathway in all other areas are less than this risk limit.

The noncancer hazard index must be below 1.0 for all chemicals associated with noncancer health effects, which act on the sample target organ. Section 742, Appendix A: Table E of TACO lists similar - acting noncarcinogenic chemicals and their target organs. Four of the site COCs were included on this list and two, ethylbenzene and toluene, have the same target organs (kidney and liver). Ethyl benzene and xylene are COCs in two areas, Area 7 and Area 11. It was necessary to determine the hazard indices for these two chemicals to insure that the total hazard index did not exceed 1.0. In order to determine the hazard index associated with the GRO for a chemical, it was assumed a 70 kilogram adult ingested 2 liters per day of water with concentrations equal to the GRO. The dose associated with this exposure was then divided by the reference dose for the chemical.

For ethyl benzene, with a GRO of 0.7 mg/L, the daily dose is calculated as follows:

$$0.02 \text{ mg/kg/day} = \frac{0.7 \text{ mg/L} \times 2 \text{ L/day (ingestion rate)}}{70 \text{ kg (bodyweight)}}$$

The daily dose is then divided by the RFD to derive the hazard index for ethylbenzene:

$$0.2 = \frac{0.02 \text{ mg/kg/day (dose)}}{0.1 \text{ mg/kg/day (RFD for ethylbenzene)}}$$

The hazard index for xylene, calculated in the manner equals 0.028. When combined, the hazard index for these two chemicals equal 0.228, well below the limit of 1.0 for mixtures.

Section 5

Conclusions

A combination of a Tier 1 and Tier 3 assessment was used to assess risks at the four major source areas of the Southeast Rockford Groundwater Superfund Site. Tier 1 was used to evaluate both the direct contact pathway and the soil to groundwater pathway. Tier 3 was used to further evaluate chemicals which exceeded the Tier 1 values for the migration from soil to groundwater pathway and to evaluate the vegetable ingestion pathway.

The Tier 1 assessment resulted in the identification of PNA hot spots in Areas 4 and 11 and individual samples in Area 9/10 which exceeded one or more PNA values. If these hot spots and exceedances were removed, all remaining semi-volatile chemical concentrations would be less than the higher of the PQL or the Tier 1 concentration.

The Tier 3 assessment resulted in soil remediation objectives for volatile organic chemicals in all four areas. The Tier 3 assessment yielded concentrations that, with one exception, were higher than the Tier 1 concentrations because the Tier 3 values incorporated site-specific information. Several VOCs exceeded their respective Tier 3 SROs, the Tier 3 concentrations were used to develop a remediation plan discussed in the Focused Feasibility Study.

Using soil to plant concentration factors and plant ingestion rates, ingestion of vegetables would not result in exceedance of a hazard index of 1.0 or a cancer risk of one in one million.

APPENDIX A

BACKUP FOR TIER 3 CALCULATIONS

INFILTRATION RATES
SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
RISK ASSESSMENT REPORT
JANUARY 2000

The infiltration rate of 4.445 centimeters per year (cm/yr) used in the RBCA equations is based on site-specific annual precipitation and site-specific ground conditions. Precipitation data for Rockford, Illinois (obtained from the Illinois State Water Survey) indicates annual rainfall of approximately 35 inches per year (88.9 cm/yr). The ground surface in source areas 4, 9/10, and 11 is largely paved, significantly reducing the amount of infiltration by surface water. In source area 7, the ground is unpaved, but the vadose zone soils contain significantly more silt and clay than the other source areas, which are predominantly composed of clean sand. One infiltration rate was used for all four source areas by assuming that five percent of the total annual precipitation of 88.9 cm/yr reaches the water table.

Table A-1
Variables for Tier 3 Models
Southeast Rockford - Source Control Operable Unit Risk Assessment

RBCA Model			
I	Infiltration Rate of Water through Soil	4.445 cm/year	site-specific
f _{oc}	Fraction of Organic Carbon in Soil	0.002 g-C/g-soil	default
i ₄	Hydraulic Gradient	0.008 m/m	site-specific
i ₇	Hydraulic Gradient	0.01 m/m	site-specific
i _{9/10}	Hydraulic Gradient	0.002 m/m	site-specific
i ₁₁	Hydraulic Gradient	0.002 m/m	site-specific
K	Aquifer Hydraulic Conductivity	38449 cm/yr	site-specific
W ₄	Width of Source Area Parallel to Groundwater Flow	3048 cm	site-specific
W _{7p}	Width of Source Area Parallel to Groundwater Flow	4,724 cm	site-specific
W _{7d}	Width of Source Area Parallel to Groundwater Flow	10,668 cm	site-specific
W _{9/10c}	Width of Source Area Parallel to Groundwater Flow	6401 cm	site-specific
W _{9/10w}	Width of Source Area Parallel to Groundwater Flow	6096 cm	site-specific
W _{9/10ne}	Width of Source Area Parallel to Groundwater Flow	366 cm	site-specific
W ₁₁	Width of Source Area Parallel to Groundwater Flow	8534 cm	site-specific
δ _{gw}	Groundwater Mixing Zone Thickness	200 cm	site-specific
θ _{as}	Volumetric Air Content in Vadose Soils	0.14 cm ³ -air/cm ³ -soil	default
θ _{ws}	Volumetric Water Content in Vadose Zone Soils	0.18 cm ³ -H ₂ O/cm ³ -soil	default
ρ _s	Soil Bulk Density	1.8 g/cm ³	default
θ _T	Total Soil Porosity	0.32 cm ³ /cm ³ -soil	default
H' ₁	Benzene	0.228 cm ³ -H ₂ O/cm ³ -air	
H' ₂	Chlorobenzene	0.152 cm ³ -H ₂ O/cm ³ -air	
H' ₃	Chloroform	0.15 cm ³ -H ₂ O/cm ³ -air	
H' ₄	1,2-Dichloroethane	0.0401 cm ³ -H ₂ O/cm ³ -air	
H' ₅	cis-1,2-Dichloroethene	0.167 cm ³ -H ₂ O/cm ³ -air	
H' ₆	2,4-Dinitrotoluene	3.8E-06 cm ³ -H ₂ O/cm ³ -air	
H' ₇	Ethylbenzene	0.323 cm ³ -H ₂ O/cm ³ -air	
H' ₈	Methylene Chloride	0.0898 cm ³ -H ₂ O/cm ³ -air	
H' ₉	2-Methylphenol	4.92E-05 cm ³ -H ₂ O/cm ³ -air	
H' ₁₀	Tetrachloroethene	0.754 cm ³ -H ₂ O/cm ³ -air	
H' ₁₁	Toluene	0.272 cm ³ -H ₂ O/cm ³ -air	
H' ₁₂	1,1,1-Trichloroethane	0.705 cm ³ -H ₂ O/cm ³ -air	
H' ₁₃	1,1,2-Trichloroethane	0.0374 cm ³ -H ₂ O/cm ³ -air	
H' ₁₄	Trichloroethene	0.422 cm ³ -H ₂ O/cm ³ -air	
H' ₁₅	Xylenes (total)	0.25 cm ³ -H ₂ O/cm ³ -air	
D ^{air1}	Benzene	0.088 cm ² /s	
D ^{air2}	Chlorobenzene	0.073 cm ² /s	
D ^{air3}	Chloroform	0.104 cm ² /s	

Table A-1
Variables for Tier 3 Models

Southeast Rockford - Source Control Operable Unit Risk Assessment

D ^{air4}	1,2-Dichloroethane	0.104 cm ² /s
D ^{air5}	cis-1,2-Dichloroethene	0.0736 cm ² /s
D ^{air6}	2,4-Dinitrotoluene	0.203 cm ² /s
D ^{air7}	Ethylbenzene	0.075 cm ² /s
D ^{air8}	Methylene Chloride	0.101 cm ² /s
D ^{air9}	2-Methylphenol	0.074 cm ² /s
D ^{air10}	Tetrachloroethene	0.072 cm ² /s
D ^{air11}	Toluene	0.087 cm ² /s
D ^{air12}	1,1,1-Trichloroethane	0.078 cm ² /s
D ^{air13}	1,1,2-Trichloroethane	0.078 cm ² /s
D ^{air14}	Trichloroethene	0.079 cm ² /s
D ^{air15}	Xylenes (total)	0.072 cm ² /s
D ^{wat1}	Benzene	9.80E-06 cm ² /s
D ^{wat2}	Chlorobenzene	8.70E-06 cm ² /s
D ^{wat3}	Chloroform	1.00E-05 cm ² /s
D ^{wat4}	1,2-Dichloroethane	9.90E-06 cm ² /s
D ^{wat5}	cis-1,2-Dichloroethene	1.13E-05 cm ² /s
D ^{wat6}	2,4-Dinitrotoluene	7.06E-06 cm ² /s
D ^{wat7}	Ethylbenzene	7.80E-06 cm ² /s
D ^{wat8}	Methylene Chloride	1.17E-05 cm ² /s
D ^{wat9}	2-Methylphenol	8.30E-06 cm ² /s
D ^{wat10}	Tetrachloroethene	8.20E-06 cm ² /s
D ^{wat11}	Toluene	8.60E-06 cm ² /s
D ^{wat12}	1,1,1-Trichloroethane	8.80E-06 cm ² /s
D ^{wat13}	1,1,2-Trichloroethane	8.80E-06 cm ² /s
D ^{wat14}	Trichloroethene	9.10E-06 cm ² /s
D ^{wat15}	Xylenes (total)	9.34E-06 cm ² /s
K _{oc1}	Benzene	58.9 cm ³ -H ₂ O/g-C
K _{oc2}	Chlorobenzene	219 cm ³ -H ₂ O/g-C
K _{oc3}	Chloroform	39.8 cm ³ -H ₂ O/g-C
K _{oc4}	1,2-Dichloroethane	17.4 cm ³ -H ₂ O/g-C
K _{oc5}	cis-1,2-Dichloroethene	35.5 cm ³ -H ₂ O/g-C
K _{oc6}	2,4-Dinitrotoluene	95.5 cm ³ -H ₂ O/g-C
K _{oc7}	Ethylbenzene	363 cm ³ -H ₂ O/g-C
K _{oc8}	Methylene Chloride	11.7 cm ³ -H ₂ O/g-C
K _{oc9}	2-Methylphenol	91.2 cm ³ -H ₂ O/g-C
K _{oc10}	Tetrachloroethene	155 cm ³ -H ₂ O/g-C
K _{oc11}	Toluene	182 cm ³ -H ₂ O/g-C
K _{oc12}	1,1,1-Trichloroethane	110 cm ³ -H ₂ O/g-C
K _{oc13}	1,1,2-Trichloroethane	50.1 cm ³ -H ₂ O/g-C
K _{oc14}	Trichloroethene	166 cm ³ -H ₂ O/g-C
K _{oc15}	Xylenes (total)	260 cm ³ -H ₂ O/g-C

Table A-1
Variables for Tier 3 Models

Southeast Rockford - Source Control Operable Unit Risk Assessment

S ₁	Benzene	1750 mg/L-H ₂ O
S ₂	Chlorobenzene	472 mg/L-H ₂ O
S ₃	Chloroform	7920 mg/L-H ₂ O
S ₄	1,2-Dichloroethane	8520 mg/L-H ₂ O
S ₅	cis-1,2-Dichloroethene	3500 mg/L-H ₂ O
S ₆	2,4-Dinitrotoluene	270 mg/L-H ₂ O
S ₇	Ethylbenzene	169 mg/L-H ₂ O
S ₈	Methylene Chloride	13000 mg/L-H ₂ O
S ₉	2-Methylphenol	26000 mg/L-H ₂ O
S ₁₀	Tetrachloroethene	200 mg/L-H ₂ O
S ₁₁	Toluene	526 mg/L-H ₂ O
S ₁₂	1,1,1-Trichloroethane	1330 mg/L-H ₂ O
S ₁₃	1,1,2-Trichloroethane	4420 mg/L-H ₂ O
S ₁₄	Trichloroethene	1100 mg/L-H ₂ O
S ₁₅	Xylenes (total)	186 mg/L-H ₂ O
GW _{obj1}	Benzene	0.005 mg/L
GW _{obj2}	Chlorobenzene	0.1 mg/L
GW _{obj3}	Chloroform	0.1 mg/L
GW _{obj4}	1,2-Dichloroethane	0.005 mg/L
GW _{obj5}	cis-1,2-Dichloroethene	0.07 mg/L
GW _{obj6}	2,4-Dinitrotoluene	0.0001 mg/L
GW _{obj7}	Ethylbenzene	0.7 mg/L
GW _{obj8}	Methylene Chloride	0.005 mg/L
GW _{obj9}	2-Methylphenol	2 mg/L
GW _{obj10}	Tetrachloroethene	0.005 mg/L
GW _{obj11}	Toluene	1 mg/L
GW _{obj12}	1,1,1-Trichloroethane	0.2 mg/L
GW _{obj13}	1,1,2-Trichloroethane	0.005 mg/L
GW _{obj14}	Trichloroethene	0.005 mg/L
GW _{obj15}	Xylenes (total)	10 mg/L
λ	Benzene	0.0009 1/day
λ	Chlorobenzene	0.0023 1/day
λ	Chloroform	0.00039 1/day
λ	1,2-Dichloroethane	0.0019 1/day
λ	cis-1,2-Dichloroethene	0.00024 1/day
λ	2,4-Dinitrotoluene	0.00192 1/day
λ	Ethylbenzene	0.00032 1/day
λ	Methylene Chloride	0.012 1/day
λ	2-Methylphenol	0.0495 1/day
λ	Tetrachloroethene	0.00096 1/day
λ	Toluene	0.011 1/day
λ	1,1,1-Trichloroethane	0.0013 1/day

Table A-2
Calculation of Leaching Factors
Southeast Rockford - Source Control Operable Unit Risk Assessment

Equation R14
Calculation of LF_{sw}

Area 4	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	l	W	LF _{SW4}
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.008	200	4.445	3048	1.308625
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.008	200	4.445	3048	0.980951
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.008	200	4.445	3048	0.62022
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.008	200	4.445	3048	0.212054
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.008	200	4.445	3048	1.384246
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.008	200	4.445	3048	0.38512
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.008	200	4.445	3048	0.372013
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.008	200	4.445	3048	0.481505
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.008	200	4.445	3048	0.888608
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.008	200	4.445	3048	0.388286
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.008	200	4.445	3048	0.282251

Area 7p	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	l	W	LF _{SW7d}
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.01	200	4.445	4724	1.555221
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.01	200	4.445	4724	1.165801
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.01	200	4.445	4724	0.737093
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.01	200	4.445	4724	0.252014
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.01	200	4.445	4724	1.645092
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.01	200	4.445	4724	0.457691
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.01	200	4.445	4724	0.442115
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.01	200	4.445	4724	0.572239
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.01	200	4.445	4724	1.056056
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.01	200	4.445	4724	0.461455
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.01	200	4.445	4724	0.335439

Table A-2
Calculation of Leaching Factors
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 7d	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	l	W	LF _{SW7p}
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.01	200	4.445	10,668	2.765665
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.01	200	4.445	10,668	2.073155
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.01	200	4.445	10,668	1.31078
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.01	200	4.445	10,668	0.448158
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.01	200	4.445	10,668	2.925483
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.01	200	4.445	10,668	0.813917
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.01	200	4.445	10,668	0.786217
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.01	200	4.445	10,668	1.017619
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.01	200	4.445	10,668	1.877995
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.01	200	4.445	10,668	0.820609
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.01	200	4.445	10,668	0.596514

Area 9/10c	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	l	W	LF _{SW9/10c}
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.002	200	4.445	6401	4.706566
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.002	200	4.445	6401	3.528062
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.002	200	4.445	6401	2.230665
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.002	200	4.445	6401	0.762669
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.002	200	4.445	6401	4.978541
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.002	200	4.445	6401	1.38511
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.002	200	4.445	6401	1.337971
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.002	200	4.445	6401	1.731768
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.002	200	4.445	6401	3.195942
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.002	200	4.445	6401	1.3965
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.002	200	4.445	6401	1.015138

Table A-2
Calculation of Leaching Factors
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 9/10w	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	l	W	LF _{SW9/10w}
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.002	200	4.445	6096	4.625366
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.002	200	4.445	6096	3.467195
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.002	200	4.445	6096	2.192181
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.002	200	4.445	6096	0.749511
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.002	200	4.445	6096	4.892649
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.002	200	4.445	6096	1.361214
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.002	200	4.445	6096	1.314888
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.002	200	4.445	6096	1.701891
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.002	200	4.445	6096	3.140805
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.002	200	4.445	6096	1.372407
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.002	200	4.445	6096	0.997624

Area 9/10ne	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	l	W	LF _{SW9/10ne}
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.002	200	4.445	366	0.693609
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.002	200	4.445	366	0.519933
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.002	200	4.445	366	0.328734
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.002	200	4.445	366	0.112395
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.002	200	4.445	366	0.73369
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.002	200	4.445	366	0.204125
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.002	200	4.445	366	0.197178
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.002	200	4.445	366	0.255212
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.002	200	4.445	366	0.470988
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.002	200	4.445	366	0.205803
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.002	200	4.445	366	0.149601

Table A-2
Calculation of Leaching Factors
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 11	ρ_s	θ_{ws}	f_{oc}	k_{oc}	H'	θ_{as}	K	i	δ_{gw}	I	W	LF_{SW11}
Benzene	1.8	0.18	0.002	59	0.228	0.14	38449	0.002	200	4.445	8534	3.020905
1,2-Dichloroethane	1.8	0.18	0.002	17	0.0401	0.14	38449	0.002	200	4.445	8534	5.159002
cis-1,2-Dichloroethene	1.8	0.18	0.002	36	0.167	0.14	38449	0.002	200	4.445	8534	3.86721
2,4-Dinitrotoluene	1.8	0.18	0.002	96	3.8E-06	0.14	38449	0.002	200	4.445	8534	2.445096
Ethylbenzene	1.8	0.18	0.002	363	0.323	0.14	38449	0.002	200	4.445	8534	0.835983
Methylene Chloride	1.8	0.18	0.002	12	0.0898	0.14	38449	0.002	200	4.445	8534	5.457122
Tetrachloroethene	1.8	0.18	0.002	155	0.754	0.14	38449	0.002	200	4.445	8534	1.518259
Toluene	1.8	0.18	0.002	182	0.272	0.14	38449	0.002	200	4.445	8534	1.466589
1,1,1-Trichloroethane	1.8	0.18	0.002	110	0.705	0.14	38449	0.002	200	4.445	8534	1.89824
1,1,2-Trichloroethane	1.8	0.18	0.002	50	0.0374	0.14	38449	0.002	200	4.445	8534	3.503164
Trichloroethene	1.8	0.18	0.002	166	0.422	0.14	38449	0.002	200	4.445	8534	1.530744
Xylenes (total)	1.8	0.18	0.002	260	0.25	0.14	38449	0.002	200	4.445	8534	1.112722

Table A-3
Calculation of Diffusion Coefficients and $C_{s,sat}$
Southeast Rockford - Source Control Operable Unit Risk Assessment

Equation S29
Calculation of C_s^{sat}

	S	ρ_s	H'	θ_{as}	θ_{ws}	f_{oc}	k_{oc}	C_s^{sat}
Benzene	1750	1.8	0.228	0.14	0.18	0.002	59	412.1833
1,2-Dichloroethane	8520	1.8	0.0401	0.14	0.18	0.002	17	1175.069
cis-1,2-Dichloroethene	3500	1.8	0.167	0.14	0.18	0.002	36	643.9611
2,4-Dinitrotoluene	270	1.8	3.8E-06	0.14	0.18	0.002	96	78.57008
Ethylbenzene	169	1.8	0.323	0.14	0.18	0.002	363	143.8397
Methylene Chloride	13000	1.8	0.0898	0.14	0.18	0.002	12	1694.998
Tetrachloroethene	200	1.8	0.754	0.14	0.18	0.002	155	93.72889
Toluene	526	1.8	0.272	0.14	0.18	0.002	182	255.1918
1,1,1-Trichloroethane	1330	1.8	0.705	0.14	0.18	0.002	110	498.5283
1,1,2-Trichloroethane	4420	1.8	0.0374	0.14	0.18	0.002	50	897.7413
Trichloroethene	1100	1.8	0.422	0.14	0.18	0.002	166	511.3044
Xylenes (total)	186	1.8	0.25	0.14	0.18	0.002	260	118.9367

Table A-4
Distance to Groundwater Management Zone (X), Source Width (Sw) and Source Thickness (Sd)
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area	Parameter					
	X (ft.)	X (cm.)	Sw (ft.)	Sw (cm.)	Sd (ft.)	Sd (cm.)
4	175	5,334	100	3,048	13	396
7p	450	13,716	200	6,096	15	457
7d	1,150	35,052	175	5,334	15	457
9/10c	700	21,336	125	3,810	10	305
9/10w	250	7,620	35	1,067	10	305
9/10ne	550	16,764	35	1,067	10	305
11	150	4,572	250	7,620	15	457

EXPLANATION

X = Distance along centerline (i.e. *parallel to direction of groundwater flow*) of plume emanating from source

Sw = Source width perpendicular to groundwater flow direction in *HORIZONTAL PLANE* (i.e. *width*)

Sd = Source width perpendicular to groundwater flow direction in *VERTICAL PLANE* (i.e. *thickness*)

Area 7p = proximal to GMZ boundary (i.e. *closest to downgradient boundary*)

Area 7d = distal to GMZ boundary (i.e. *farthest from downgradient boundary*)

Area 9/10c = located in central part of Sundstrand Plant #1 (i.e. *loading dock area*)

Area 9/10ne = located at northeast end of Area 9/10 (i.e. *@ former Mid-States property*)

Area 9/10w = located at west end of Sundstrand Plant #1 (i.e. *outdoor drum storage area*)

Table A-5
Calculation of Attenuation Factors
Southeast Rockford - Source Control Operable Unit Risk Assessment

Steady-State Attenuation along the centerline of a dissolved plume

Equation R15

Calculation of $C_{(x)}/C_{source}$

Area 4	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
1,2-Dichloroethane	5,334	533.4	0.0019	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.020405	0.005	0.245039
cis-1,2-Dichloroethene	5,334	533.4	0.00024	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.249361	0.07	0.280718
2,4-Dinitrotoluene	5,334	533.4	0.00192	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.019894	0.0001	0.005027
Ethylbenzene	5,334	533.4	0.00032	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.215422	0.7	3.249438
Methylene Chloride	5,334	533.4	0.012	2.633493	177.8	26.67	3,048	396	0.782	0.525	4.57E-06	0.005	1094.826
Tetrachloroethene	5,334	533.4	0.00096	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.074947	0.005	0.066714
Toluene	5,334	533.4	0.011	2.633493	177.8	26.67	3,048	396	0.782	0.525	8.58E-06	1	116536.8
1,1,1-Trichloroethane	5,334	533.4	0.0013	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.045553	0.2	4.390486
1,1,2-Trichloroethane	5,334	533.4	0.00095	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.076095	0.005	0.065707
Trichloroethene	5,334	533.4	0.00042	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.180353	0.005	0.027723
Xylenes (total)	5,334	533.4	0.0019	2.633493	177.8	26.67	3,048	396	0.782	0.525	0.020405	10	490.0774

Area 7p	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
1,2-Dichloroethane	13,716	1371.6	0.0019	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.000874	0.005	5.720157
cis-1,2-Dichloroethene	13,716	1371.6	0.00024	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.063787	0.07	1.097407
2,4-Dinitrotoluene	13,716	1371.6	0.00192	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.000839	0.0001	0.119161
Ethylbenzene	13,716	1371.6	0.00032	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.048436	0.7	14.45219
Methylene Chloride	13,716	1371.6	0.012	3.291866	457.2	68.58	6,096	457	0.609	0.236	2.65E-09	0.005	1887212
Tetrachloroethene	13,716	1371.6	0.00096	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.007459	0.005	0.670359
Toluene	13,716	1371.6	0.011	3.291866	457.2	68.58	6,096	457	0.609	0.236	6.7E-09	1	1.49E+08
1,1,1-Trichloroethane	13,716	1371.6	0.0013	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.003235	0.2	61.82083
1,1,2-Trichloroethane	13,716	1371.6	0.00095	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.007654	0.005	0.653231
Trichloroethene	13,716	1371.6	0.00042	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.034898	0.005	0.143275
Xylenes (total)	13,716	1371.6	0.0019	3.291866	457.2	68.58	6,096	457	0.609	0.236	0.000874	10	11440.31

Table A-5
 Calculation of Attenuation Factors
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 7d	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
1,2-Dichloroethane	35,052	3505.2	0.0019	3.291866	1168.4	175.26	5,334	457	0.208	0.092	1.01E-06	0.005	4944.997
cis-1,2-Dichloroethene	35,052	3505.2	0.00024	3.291866	1168.4	175.26	5,334	457	0.208	0.092	0.002915	0.07	24.01091
2,4-Dinitrotoluene	35,052	3505.2	0.00192	3.291866	1168.4	175.26	5,334	457	0.208	0.092	9.42E-07	0.0001	106.1198
Ethylbenzene	35,052	3505.2	0.00032	3.291866	1168.4	175.26	5,334	457	0.208	0.092	0.001639	0.7	427.0124
Methylene Chloride	35,052	3505.2	0.012	3.291866	1168.4	175.26	5,334	457	0.208	0.092	7.54E-16	0.005	6.63E+12
Tetrachloroethene	35,052	3505.2	0.00096	3.291866	1168.4	175.26	5,334	457	0.208	0.092	4.51E-05	0.005	110.8823
Toluene	35,052	3505.2	0.011	3.291866	1168.4	175.26	5,334	457	0.208	0.092	3.4E-15	1	2.94E+14
1,1,1-Trichloroethane	35,052	3505.2	0.0013	3.291866	1168.4	175.26	5,334	457	0.208	0.092	1E-05	0.2	19967.74
1,1,2-Trichloroethane	35,052	3505.2	0.00095	3.291866	1168.4	175.26	5,334	457	0.208	0.092	4.73E-05	0.005	105.7595
Trichloroethene	35,052	3505.2	0.00042	3.291866	1168.4	175.26	5,334	457	0.208	0.092	0.000844	0.005	5.925021
Xylenes (total)	35,052	3505.2	0.0019	3.291866	1168.4	175.26	5,334	457	0.208	0.092	1.01E-06	10	9889994

Area 9/10c	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
1,2-Dichloroethane	21,336	2133.6	0.0019	0.658373	711.2	106.68	3,810	305	0.245	0.101	4.63E-11	0.005	1.08E+08
cis-1,2-Dichloroethene	21,336	2133.6	0.00024	0.658373	711.2	106.68	3,810	305	0.245	0.101	0.00018	0.07	388.0742
2,4-Dinitrotoluene	21,336	2133.6	0.00192	0.658373	711.2	106.68	3,810	305	0.245	0.101	4.08E-11	0.0001	2452636
Ethylbenzene	21,336	2133.6	0.00032	0.658373	711.2	106.68	3,810	305	0.245	0.101	5.4E-05	0.7	12972.72
Methylene Chloride	21,336	2133.6	0.012	0.658373	711.2	106.68	3,810	305	0.245	0.101	3.08E-27	0.005	1.62E+24
Tetrachloroethene	21,336	2133.6	0.00096	0.658373	711.2	106.68	3,810	305	0.245	0.101	4.98E-08	0.005	100458.3
Toluene	21,336	2133.6	0.011	0.658373	711.2	106.68	3,810	305	0.245	0.101	4.35E-26	1	2.3E+25
1,1,1-Trichloroethane	21,336	2133.6	0.0013	0.658373	711.2	106.68	3,810	305	0.245	0.101	3.05E-09	0.2	65578456
1,1,2-Trichloroethane	21,336	2133.6	0.00095	0.658373	711.2	106.68	3,810	305	0.245	0.101	5.44E-08	0.005	91940.8
Trichloroethene	21,336	2133.6	0.00042	0.658373	711.2	106.68	3,810	305	0.245	0.101	1.4E-05	0.005	356.789
Xylenes (total)	21,336	2133.6	0.0019	0.658373	711.2	106.68	3,810	305	0.245	0.101	4.63E-11	10	2.16E+11

Table A-5
Calculation of Attenuation Factors
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 9/10w	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
1,2-Dichloroethane	7,620	762	0.0019	0.658373	254	38.1	1,067	305	0.192	0.283	1.58E-06	0.005	3174.248
cis-1,2-Dichloroethene	7,620	762	0.00024	0.658373	254	38.1	1,067	305	0.192	0.283	0.006898	0.07	10.14761
2,4-Dinitrotoluene	7,620	762	0.00192	0.658373	254	38.1	1,067	305	0.192	0.283	1.46E-06	0.0001	68.34627
Ethylbenzene	7,620	762	0.00032	0.658373	254	38.1	1,067	305	0.192	0.283	0.003742	0.7	187.0447
Methylene Chloride	7,620	762	0.012	0.658373	254	38.1	1,067	305	0.192	0.283	4.61E-16	0.005	1.08E+13
Tetrachloroethene	7,620	762	0.00096	0.658373	254	38.1	1,067	305	0.192	0.283	8.45E-05	0.005	59.14507
Toluene	7,620	762	0.011	0.658373	254	38.1	1,067	305	0.192	0.283	2.22E-15	1	4.5E+14
1,1,1-Trichloroethane	7,620	762	0.0013	0.658373	254	38.1	1,067	305	0.192	0.283	1.74E-05	0.2	11480.92
1,1,2-Trichloroethane	7,620	762	0.00095	0.658373	254	38.1	1,067	305	0.192	0.283	8.88E-05	0.005	56.27691
Trichloroethene	7,620	762	0.00042	0.658373	254	38.1	1,067	305	0.192	0.283	0.001852	0.005	2.699412
Xylenes (total)	7,620	762	0.0019	0.658373	254	38.1	1,067	305	0.192	0.283	1.58E-06	10	6348497

Area 9/10ne	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
1,2-Dichloroethane	16,764	1676.4	0.0019	0.658373	558.8	83.82	1,067	305	0.087	0.129	3.36E-10	0.005	14889382
cis-1,2-Dichloroethene	16,764	1676.4	0.00024	0.658373	558.8	83.82	1,067	305	0.087	0.129	0.000196	0.07	357.2264
2,4-Dinitrotoluene	16,764	1676.4	0.00192	0.658373	558.8	83.82	1,067	305	0.087	0.129	3E-10	0.0001	333280.4
Ethylbenzene	16,764	1676.4	0.00032	0.658373	558.8	83.82	1,067	305	0.087	0.129	6.93E-05	0.7	10100.39
Methylene Chloride	16,764	1676.4	0.012	0.658373	558.8	83.82	1,067	305	0.087	0.129	1.65E-24	0.005	3.03E+21
Tetrachloroethene	16,764	1676.4	0.00096	0.658373	558.8	83.82	1,067	305	0.087	0.129	1.56E-07	0.005	32030.21
Toluene	16,764	1676.4	0.011	0.658373	558.8	83.82	1,067	305	0.087	0.129	1.72E-23	1	5.81E+22
1,1,1-Trichloroethane	16,764	1676.4	0.0013	0.658373	558.8	83.82	1,067	305	0.087	0.129	1.34E-08	0.2	14901816
1,1,2-Trichloroethane	16,764	1676.4	0.00095	0.658373	558.8	83.82	1,067	305	0.087	0.129	1.69E-07	0.005	29634.36
Trichloroethene	16,764	1676.4	0.00042	0.658373	558.8	83.82	1,067	305	0.087	0.129	2.16E-05	0.005	231.9221
Xylenes (total)	16,764	1676.4	0.0019	0.658373	558.8	83.82	1,067	305	0.087	0.129	3.36E-10	10	2.98E+10

Table A-5
 Calculation of Attenuation Factors
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 11	X	α_x	λ	U cm/day	α_y	α_z	S_w (cm.)	S_d (cm.)	erf(1)	erf(2)	$C_{(x)}/C_{source}$	GWobj	GWsource
Benzene	4,572	457.2	0.0009	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.008764	0.005	0.570504
1,2-Dichloroethane	4,572	457.2	0.0019	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.000367	0.005	13.63107
cis-1,2-Dichloroethene	4,572	457.2	0.00024	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.159147	0.07	0.439845
2,4-Dinitrotoluene	4,572	457.2	0.00192	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.000347	0.0001	0.288125
Ethylbenzene	4,572	457.2	0.00032	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.104895	0.7	6.673334
Methylene Chloride	4,572	457.2	0.012	0.658373	152.4	22.86	7,620	457	2.282	0.707	1.91E-11	0.005	2.61E+08
Tetrachloroethene	4,572	457.2	0.00096	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.007033	0.005	0.710981
Toluene	4,572	457.2	0.011	0.658373	152.4	22.86	7,620	457	2.282	0.707	6.41E-11	1	1.56E+10
1,1,1-Trichloroethane	4,572	457.2	0.0013	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.002199	0.2	90.94383
1,1,2-Trichloroethane	4,572	457.2	0.00095	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.007293	0.005	0.685611
Trichloroethene	4,572	457.2	0.00042	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.064393	0.005	0.077648
Xylenes (total)	4,572	457.2	0.0019	0.658373	152.4	22.86	7,620	457	2.282	0.707	0.000367	10	27262.15

Table A-6
Calculation of Risk-Based Soil Level
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 4	$C_{(x)}/C_{source}$	GWobj	GWsource	LF _{sw}	RBSLatten
1,2-Dichloroethane	0.020404941	0.005	0.245039	1.308625	0.187248935
cis-1,2-Dichloroethene	0.249360862	0.07	0.280718	0.980951	0.286168805
2,4-Dinitrotoluene	0.019893571	0.0001	0.005027	0.62022	0.008104787
Ethylbenzene	0.215421847	0.7	3.249438	0.212054	15.32361273
Methylene Chloride	4.56693E-06	0.005	1094.826	1.384246	790.9188286
Tetrachloroethene	0.074946511	0.005	0.066714	0.38512	0.173229959
Toluene	8.58098E-06	1	116536.8	0.372013	313260.1666
1,1,1-Trichloroethane	0.045553047	0.2	4.390486	0.481505	9.118254636
1,1,2-Trichloroethane	0.076095025	0.005	0.065707	0.888608	0.073944114
Trichloroethene	0.180353208	0.005	0.027723	0.388286	0.071399301
Xylenes (total)	0.020404941	10	490.0774	0.282251	1736.314619

Area 7p	$C_{(x)}/C_{source}$	GWobj	GWsource	LF _{sw}	RBSLatten
1,2-Dichloroethane	0.000874102	0.005	5.720157	1.555221	3.67803434
cis-1,2-Dichloroethene	0.063786706	0.07	1.097407	1.165801	0.94133358
2,4-Dinitrotoluene	0.000839204	0.0001	0.119161	0.737093	0.161662782
Ethylbenzene	0.048435575	0.7	14.45219	0.252014	57.3468541
Methylene Chloride	2.64941E-09	0.005	1887212	1.645092	1147177.109
Tetrachloroethene	0.007458691	0.005	0.670359	0.457691	1.464653639
Toluene	6.70175E-09	1	1.49E+08	0.442115	337502367.7
1,1,1-Trichloroethane	0.003235156	0.2	61.82083	0.572239	108.0331689
1,1,2-Trichloroethane	0.007654257	0.005	0.653231	1.056056	0.618557384
Trichloroethene	0.034897883	0.005	0.143275	0.461455	0.310485909
Xylenes (total)	0.000874102	10	11440.31	0.335439	34105.53325

Area 7d	$C_{(x)}/C_{source}$	GWobj	GWsource	LF _{sw}	RBSLatten
1,2-Dichloroethane	1.01112E-06	0.005	4944.997	2.765665	1787.995487
cis-1,2-Dichloroethene	0.002915341	0.07	24.01091	2.073155	11.58182183
2,4-Dinitrotoluene	9.42331E-07	0.0001	106.1198	1.31078	80.95927777
Ethylbenzene	0.001639297	0.7	427.0124	0.448158	952.8161082
Methylene Chloride	7.53795E-16	0.005	6.63E+12	2.925483	2.26735E+12
Tetrachloroethene	4.50929E-05	0.005	110.8823	0.813917	136.2329608
Toluene	3.40027E-15	1	2.94E+14	0.786217	3.74062E+14
1,1,1-Trichloroethane	1.00162E-05	0.2	19967.74	1.017619	19622.02561
1,1,2-Trichloroethane	4.72771E-05	0.005	105.7595	1.877995	56.31511884
Trichloroethene	0.000843879	0.005	5.925021	0.820609	7.220270305
Xylenes (total)	1.01112E-06	10	9889994	0.596514	16579654.76

Table A-6
Calculation of Risk-Based Soil Level
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 9/10c	C_(x)/C_{source}	GWobj	GWsource	LF_{sw}	RBSLatten
1,2-Dichloroethane	4.63264E-11	0.005	1.08E+08	4.706566	22931763.56
cis-1,2-Dichloroethene	0.000180378	0.07	388.0742	3.528062	109.9964084
2,4-Dinitrotoluene	4.07725E-11	0.0001	2452636	2.230665	1099508.557
Ethylbenzene	5.39594E-05	0.7	12972.72	0.762669	17009.6346
Methylene Chloride	3.08458E-27	0.005	1.62E+24	4.978541	3.2559E+23
Tetrachloroethene	4.97719E-08	0.005	100458.3	1.38511	72527.26415
Toluene	4.34853E-26	1	2.3E+25	1.337971	1.71874E+25
1,1,1-Trichloroethane	3.04978E-09	0.2	65578456	1.731768	37867927.15
1,1,2-Trichloroethane	5.43828E-08	0.005	91940.8	3.195942	28767.9776
Trichloroethene	1.40139E-05	0.005	356.789	1.3965	255.4879898
Xylenes (total)	4.63264E-11	10	2.16E+11	1.015138	2.12641E+11

Area 9/10w	C_(x)/C_{source}	GWobj	GWsource	LF_{sw}	RBSLatten
1,2-Dichloroethane	1.57518E-06	0.005	3174.248	4.625366	686.269702
cis-1,2-Dichloroethene	0.006898175	0.07	10.14761	3.467195	2.926749719
2,4-Dinitrotoluene	1.46314E-06	0.0001	68.34627	2.192181	31.17729134
Ethylbenzene	0.003742421	0.7	187.0447	0.749511	249.5557248
Methylene Chloride	4.60947E-16	0.005	1.08E+13	4.892649	2.21705E+12
Tetrachloroethene	8.45379E-05	0.005	59.14507	1.361214	43.45023967
Toluene	2.21979E-15	1	4.5E+14	1.314888	3.42609E+14
1,1,1-Trichloroethane	1.74202E-05	0.2	11480.92	1.701891	6745.981375
1,1,2-Trichloroethane	8.88464E-05	0.005	56.27691	3.140805	17.91799288
Trichloroethene	0.001852255	0.005	2.699412	1.372407	1.966917557
Xylenes (total)	1.57518E-06	10	6348497	0.997624	6363614.903

Area 9/10ne	C_(x)/C_{source}	GWobj	GWsource	LF_{sw}	RBSLatten
1,2-Dichloroethane	3.3581E-10	0.005	14889382	0.693609	21466525.77
cis-1,2-Dichloroethene	0.000195954	0.07	357.2264	0.519933	687.0629051
2,4-Dinitrotoluene	3.00048E-10	0.0001	333280.4	0.328734	1013828.702
Ethylbenzene	6.93043E-05	0.7	10100.39	0.112395	89865.12713
Methylene Chloride	1.65113E-24	0.005	3.03E+21	0.73369	4.12739E+21
Tetrachloroethene	1.56103E-07	0.005	32030.21	0.204125	156915.0566
Toluene	1.71975E-23	1	5.81E+22	0.197178	2.94901E+23
1,1,1-Trichloroethane	1.34212E-08	0.2	14901816	0.255212	58390035.77
1,1,2-Trichloroethane	1.68723E-07	0.005	29634.36	0.470988	62919.58914
Trichloroethene	2.1559E-05	0.005	231.9221	0.205803	1126.912926
Xylenes (total)	3.3581E-10	10	2.98E+10	0.149601	1.99054E+11

Table A-6
Calculation of Risk-Based Soil Level
Southeast Rockford - Source Control Operable Unit Risk Assessment

Area 11	C_(x)/C_{source}	GWobj	GWsource	LF_{sw}	RBSLatten
Benzene	0.008764188	0.005	0.570504	3.020905	0.188851868
1,2-Dichloroethane	0.000366809	0.005	13.63107	5.159002	2.642192371
cis-1,2-Dichloroethene	0.159147054	0.07	0.439845	3.86721	0.113736962
2,4-Dinitrotoluene	0.000347072	0.0001	0.288125	2.445096	0.117837903
Ethylbenzene	0.104895099	0.7	6.673334	0.835983	7.982618287
Methylene Chloride	1.91221E-11	0.005	2.61E+08	5.457122	47914948.52
Tetrachloroethene	0.007032536	0.005	0.710981	1.518259	0.468286992
Toluene	6.41356E-11	1	1.56E+10	1.466589	10631447718
1,1,1-Trichloroethane	0.00219916	0.2	90.94383	1.89824	47.90954185
1,1,2-Trichloroethane	0.007292762	0.005	0.685611	3.503164	0.195712015
Trichloroethene	0.06439305	0.005	0.077648	1.530744	0.05072575
Xylenes (total)	0.000366809	10	27262.15	1.112722	24500.41827

APPENDIX B

DATA TABLES

Appendix B

Area 4 - Subsurface Above 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/29/93
Sample Number	SB4-2A
Organic Traffic Report Number	EXR37
<u><i>Volatile Organics (ug/Kg)</i></u>	
<u><i>Semivolatile Organics (ug/Kg)</i></u>	
<u><i>Pesticides & PCBs (ug/Kg)</i></u>	
gamma-BHC (Lindane)	0.12
Endosulfan II	0.22
4,4'-DDD	0.24

Appendix B

Area 7 - Subsurface Above 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	8/19/93	6/22/93	6/23/93	9/24/93
Sample Number	SB134A	SB7-5B	SB7-10A	SB7-24A
Organic Traffic Report Number	EXR71	EXR12	EXR23	EXS12
<u>Volatile Organics (ug/Kg)</u>	CA	CA	CA	CA
Methylene Chloride	6			
Acetone	10	10		8400
Carbon Disulfide	2			
1,1-Dichloroethene	3			
1,1-Dichloroethane	39			
1,2-Dichloroethene (total)		5	49000	
1,1,1-Trichloroethane	580	11	110000	360000
Trichloroethene	590	3	5500	24000
1,1,2-Trichloroethane	4			
Tetrachloroethene	1500	29	16000	110000
Toluene	1	23	23000	
Ethylbenzene		2	26000	15000
Styrene			1600	
Xylene		11	210000	110000
<u>Semivolatile Organics (ug/Kg)</u>				
Naphthalene			15000	1000
2-Methylnaphthalene			10000	1100
2,4-Dinitrotoluene			1500	
Diethylphthalate		33		
Fluorene				130
Phenanthrene				140
Di-n-Butylphthalate		49	2100	
bis(2-Ethylhexyl)Phthalate		110		1200
<u>Pesticides & PCBs (ug/Kg)</u>				
Heptachlor epoxide				3.3
Aroclor-1254			480	

Appendix B

Area 4 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	9/22/93	9/22/93	6/10/96	6/10/96	6/10/96	6/10/96	6/10/96	6/10/96
Sample Number	SS4-7	SS4-8	SS4-205	SS4-201	SS4-203-D	SS4-204	SS4-203	SS4-202
Organic Traffic Report Number	EXS08	EXS09	EBFY5	EBFY0	EBFY2	EBFY4	EBFY3	EBFY1
<i>Volatile Organics (ug/kg)</i>								
Methylene Chloride	12	18						
1,2-Dichloroethene (total)		3						
1,2-Dichloroethane	17							
1,1,1-Trichloroethane	7	110						
1,2-Dichloropropane			2		1			
Trichloroethene		25						
Toluene	11	3						
<i>Semivolatile Organics (ug/kg)</i>								
Naphthalene				49	260		210	
2-Methylnaphthalene				58	120		110	
Acenaphthene					960		850	
Dibenzofuran					550		420	
Fluorene					920		720	
Phenanthrene	150			570	16000		8600	420
Anthracene				72	1000		960	50
Carbazole				78	1400		1100	48
Di-n-Butylphthalate			100	66	72		51	57
Fluoranthene	170	160	81	1100	12000	44	11000	790
Pyrene	160	130		640	4700	45	5000	290
Butylbenzylphthalate				130	180		60	
Benzo(a)anthracene			53	420	5600		4700	330
Chrysene	110	100	72	580	5900		5200	400
bis(2-Ethylhexyl)Phthalate	1400	340	300	9000	320	330	300	1200
Di-n-Octyl Phthalate				67				
Benzo (b) Fluoranthene	110	110	150	1200	11000	67	9600	640
Benzo (k) Fluoranthene	84	84	160	1300	11000	70	9900	670
Benzo (a) Pyrene	140			160	860		1100	97
Ideno (1,2,3-cd) Pyrene				79	500		620	75
Dibenzo (a,h) Anthracene				41	430		390	52
Benzo (g,h,i) Perylene					56		70	
<i>Pesticides & PCBs (ug/kg)</i>								
delta-BHC				0.29			0.095	0.29
Aldrin			0.39				0.29	
Heptachlor epoxide				0.52				0.7
Endosulfan I					0.13			
Dieldrin			0.53	3.8	0.29		0.98	3.9
4,4'-DDE	3.9		0.84	1.3				0.83
Endrin							0.61	
Endosulfan II				0.4	0.35		0.2	
4,4'-DDD	4.3		0.45	0.96	1.9		0.95	0.13
4,4'-DDT	22	4.7	3.7	18				
Methoxychlor			1.2	20	26		21	5.2
Endrin ketone			0.34					0.3
Endrin aldehyde	17	9.8	0.33	1				0.61
alpha-Chlordane	3.9		0.21	3.4	0.27		0.2	2
gamma-Chlordane	2.7			1.1				
Aroclor-1254			8.4	49	30			36
Aroclor-1260	100							

Appendix B

Area 4 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/10/96	6/10/96	6/10/96	6/10/96	6/10/96	6/10/96	9/22/93	9/22/93
Sample Number	SS4-201	SS4-202	SS4-203-D	SS4-203	SS4-204	SS4-205	SS4-7	SS4-8
Organic Traffic Report Number	MEAPB0	MEAPB1	MEAPB2	MEAPB3	MEAPB4	MEAPB5	MEWJ98	MEWJ99
<i>Inorganics (mg/Kg)</i>								
Aluminum	4330	8860	2550	3860	6360	8330	11500	7580
Antimony							7.6	7.3
Arsenic	3	5.5	2.8	2.8	3.9	6.2	4.1	3.5
Barium	59.7	119	27	31.6	92	113	216	55.8
Beryllium	0.39	0.56	0.35	0.7	0.44	0.58	0.43	0.28
Cadmium	1.2	1.1	0.53	0.46		0.43	7.4	1.5
Calcium	37500	11100	131000	87600	2590	4700	27000	22900
Chromium	12.6	15.4	5.4	6.7	10.2	13.5	57.5	12.9
Cobalt	3	6.2	2.9	2.8	4.9	6	5.1	3.2
Copper	22.9	148	10.2	13.2	7.8	14.1	42.6	14.3
Iron	11400	13600	7390	13000	10000	13500	12300	9150
Lead	112	102	25.1	20.3	15.1	39.1	92	46.3
Magnesium	19100	6560	83700	54500	1530	2690	16500	13400
Manganese	489	592	313	264	477	572	452	360
Nickel	8.7	13.8	7.2	6.8	8	11.5	18.8	8.5
Potassium	600	808	296	388	426	856	1140	778
Selenium	0.92	1.1			1.1		1.2	
Silver							0.94	
Sodium	279	93.4	141	223	87.5	70.8	147	198
Thallium	1.4	2.4	1.5	1.6	1.3	1.7	1.9	
Vanadium	10.7	23.2	9.9	12.5	21.1	26.1	29.4	22.1
Zinc	742	645	89.8	89.9	34	64.9	554	64.3
Cyanide	0.35	0.46				0.23	4.8	

Appendix B

Area 7 - Surface
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/21/96	6/21/96	6/21/96	6/21/96	6/21/96	9/22/93	9/22/93
Sample Number	SS7-105	SS7-102	SS7-103	SS7-104	SS7-101	SS7-1	SS7-1(D)
Organic Traffic Report Number	EBGH9	EBGJ0	EBGJ1	EBGJ2	EBGJ3	EXR99	EXS01
<i>Volatile Organics (ug/kg)</i>							
Methylene Chloride						13	31
Acetone						10	28
1,1-Dichloroethane							
1,2-Dichloroethene (total)							
1,2-Dichloroethane							
1,1,1-Trichloroethane		5					
Trichloroethene							
Tetrachloroethene							
1,1,2,2-Tetrachloroethane							
Toluene				1			
<i>Semivolatile Organics (ug/kg)</i>							
Isophorone							
Fluoranthene							
Pyrene							
bis(2-Ethylhexyl)Phthalate	46	77	49	70	53	85	240
Benzo (a) Pyrene							
<i>Pesticides & PCBs (ug/kg)</i>							
Dieldrin							
4,4'-DDE							
Endosulfan II							
4,4'-DDT							
Endrin aldehyde							
gamma-Chlordane							
Aroclor-1260							
Date Sampled	6/21/96	6/21/96	6/21/96	6/21/96	6/21/96	9/22/93	9/22/93
Sample Number	SS7-102	SS7-103	SS7-104	SS7-101	SS7-105	SS7-1(D)	SS7-2
Organic Traffic Report Number	MEAPJ0	MEAPJ1	MEAPJ2	MEAPJ3	MEAPH9	MEWJ91	MEWJ92
<i>Inorganics (mg/Kg)</i>							
Aluminum	15000	9030	9980	8630	9270	14000	15800
Antimony						9.4	11.8
Arsenic	6.8	4.3	4.4	3.6	3.9	4.9	5.8
Barium	114	67.6	61.2	56.7	41.6	82	140
Beryllium	0.66	0.15	0.22	0.13	0.15	0.33	0.43
Cadmium							
Calcium	2300	1560	9400	929	8540	2010	27100
Chromium	17.8	11.1	11.4	10.1	10.5	16	18.7
Cobalt	9.2	5.6	6.1	5.4	5.2	5.8	6.2
Copper	15.3	8.2	9.9	7.6	11.6	16.7	18.6
Iron	19200	11800	13500	10600	11800	14400	15300
Lead	22.3	12.9	10.9	12.6	14.4	10	19.9
Magnesium	2630	1530	6130	1400	4790	2450	17400
Manganese	698	400	406	391	292	452	573
Mercury	0.06						
Nickel	14.4	7.3	9.7	7.9	9.3	13.3	13.4
Potassium	1270	801	800	858	1140	1180	1550
Selenium	0.98					1	0.99
Silver							
Sodium	37.7	31.4	36.4	26.7	33.5	124	161
Thallium							
Vanadium	32.5	24.3	24.5	19.2	20.2	31.3	35.9
Zinc	54.1	31.3	35.6	32	34.6	35.7	80.5
Cyanide	0.35	0.37	0.25	0.28	0.27		

Appendix B

Area 7 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	9/22/93	9/22/93	9/22/93	9/22/93
Sample Number	SS7-3	SS7-10	SS7-21	SS7-23
Organic Traffic Report Number	EXS03	EXS04	EXS05	EXS06
<i><u>Volatile Organics (ug/kg)</u></i>				
Methylene Chloride	4	33	5	6
Acetone	17	62		12
1,1-Dichloroethane		8		
1,2-Dichloroethene (total)		220		
1,2-Dichloroethane	8			7
1,1,1-Trichloroethane		40		
Trichloroethene		140	4	
Tetrachloroethene		400	75	5
1,1,2,2-Tetrachloroethane		12		
Toluene	7	4		3
<i><u>Semivolatile Organics (ug/kg)</u></i>				
Isophorone		150		
Fluoranthene				42
Pyrene				37
bis(2-Ethylhexyl)Phthalate	170	570	310	330
Benzo (a) Pyrene		170		
<i><u>Pesticides & PCBs (ug/kg)</u></i>				
Dieldrin		5.3	23	
4,4'-DDE		13		
Endosulfan II		15		
4,4'-DDT		35		12
Endrin aldehyde		33	8.2	8.5
gamma-Chlordane		20		
Aroclor-1260		450		
Date Sampled	9/22/93	9/22/93	9/22/93	9/22/93
Sample Number	SS7-10	SS7-21	SS7-23	SS7-1
Organic Traffic Report Number	MEWJ94	MEWJ95	MEWJ96	MEWJ90
<i><u>Inorganics (mg/Kg)</u></i>				
Aluminum	14100	14200	13400	12700
Antimony	12.4	12.7	10.7	11.6
Arsenic	5.2	6.2	5.1	4.9
Barium	260	161	114	77.7
Beryllium	0.42	0.47	0.32	0.36
Cadmium	1.6			
Calcium	1990	7250	7180	1960
Chromium	55.1	46.6	31.5	15.5
Cobalt	11.3	6.9	5.9	6.2
Copper	148	30.9	34.7	16.3
Iron	18600	16600	17000	14200
Lead	180	217	151	9.7
Magnesium	2110	4830	4770	2360
Manganese	433	631	435	499
Mercury	2.2		0.11	
Nickel	49.1	14.8	16.5	12.7
Potassium	1320	1550	1270	979
Selenium	1.2	1.4	1.4	0.92
Silver	1.4			
Sodium	115	130	178	117
Thallium				2.1
Vanadium	31.1	36.4	32.4	27.5
Zinc	177	151	108	36.4
Cyanide	2.9			

Appendix B

Area 9 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled Sample Number Organic Traffic Report Number	6/25/96 SS9/10-104 EBGK7		6/25/96 SS9/10-102 EBGK4		6/25/96 SS9/10-101 EBGK5		6/25/96 SS9/10-103 EBGK6		6/24/96 SS9/10-105(S) EBGK8	
<u>Volatile Organics (ug/Kg)</u>										
Chloromethane	11	UJ	11	U	10	U	12	UJ	110	U
Bromomethane	11	UJ	11	U	10	U	12	UJ	110	U
Vinyl Chloride	11	UJ	11	U	10	U	12	UJ	110	U
Chloroethane	11	UJ	11	U	10	U	12	UJ	110	U
Methylene Chloride	11	BJU	2	J	3	J	12	BUJ	110	BJU
Acetone	11	U	11	U	10	U	12	UJ	110	U
Carbon Disulfide	11	UJ	11	U	10	U	12	UJ	110	U
1,1-Dichloroethene	11	UJ	11	U	10	U	12	UJ	110	U
1,1-Dichloroethane	11	UJ	11	U	10	U	12	UJ	110	U
1,2-Dichloroethene (total)	11	UJ	11	U	10	U	12	UJ	110	U
Chloroform	11	UJ	11	U	10	U	12	UJ	110	U
1,2-Dichloroethane	11	UJ	11	U	10	U	12	UJ	110	U
2-Butanone	11	UJ	11	U	10	U	12	UJ	110	U
1,1,1-Trichloroethane	11	UJ	11	U	10	U	12	UJ	110	U
Carbon Tetrachloride	11	UJ	11	U	10	U	12	UJ	110	U
Bromodichloromethane	11	UJ	11	U	10	U	12	UJ	110	U
1,2-Dichloropropane	11	UJ	11	U	10	U	12	UJ	110	U
cis-1,3-Dichloropropene	11	UJ	11	U	10	U	12	UJ	110	U
Trichloroethene	11	UJ	11	U	10	U	12	UJ	110	U
Dibromochloromethane	11	UJ	11	U	10	U	12	UJ	110	U
1,1,2-Trichloroethane	11	UJ	11	U	10	U	12	UJ	110	U
Benzene	11	UJ	11	U	10	U	12	UJ	110	U
trans-1,3-Dichloropropene	11	UJ	11	U	10	U	12	UJ	110	U
Bromoform	11	UJ	11	U	10	U	12	UJ	110	U
4-Methyl-2-Pentanone	11	UJ	11	U	10	U	12	UJ	110	U
2-Hexanone	11	UJ	11	U	10	U	12	UJ	110	U
Tetrachloroethene	11	UJ	11	U	10	U	12	UJ	110	U
1,1,2,2-Tetrachloroethane	11	UJ	11	U	10	U	12	UJ	110	U
Toluene	11	UJ	11	U	10	U	12	UJ	11	J
Chlorobenzene	11	UJ	11	U	10	U	12	UJ	110	U
Ethylbenzene	11	UJ	11	U	10	U	12	UJ	110	U
Styrene	11	UJ	11	U	10	U	12	UJ	110	U
Xylene	11	UJ	11	U	10	U	12	UJ	110	U

Appendix B

Area 9 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled Sample Number Organic Traffic Report Number	6/25/96 SS9/10-104 EBGK7		6/25/96 SS9/10-102 EBGK4		6/25/96 SS9/10-101 EBGK5		6/25/96 SS9/10-103 EBGK6		6/24/96 SS9/10-105(S) EBGK8	
<u>Semivolatile Organics (ug/Kg)</u>										
Phenol	1500	U	430	U	1700	U	1800	U		
bis(2-Chloroethyl)Ether	1500	U	430	U	1700	U	1800	U		
2-Chlorophenol	1500	U	430	U	1700	U	1800	U		
1,3-Dichlorobenzene	1500	U	430	U	1700	U	1800	U		
1,4-Dichlorobenzene	1500	U	430	U	1700	U	1800	U		
1,2-Dichlorobenzene	1500	U	430	U	1700	U	1800	U		
2-Methylphenol	1500	U	430	U	1700	U	1800	U		
2,2'-oxybis(1-Chloropropane)	1500	U	430	UJ	1700	UJ	1800	UJ		
4-Methylphenol	1500	U	430	U	1700	U	1800	U		
N-Nitroso-Di-n-Propylamine	1500	U	430	U	1700	U	1800	U		
Hexachloroethane	1500	U	430	U	1700	U	1800	U		
Nitrobenzene	1500	U	430	U	1700	U	1800	U		
Isophorone	1500	U	430	U	1700	U	1800	U		
2-Nitrophenol	1500	U	430	U	1700	U	1800	U		
2,4-Dimethylphenol	1500	U	430	U	1700	U	1800	U		
bis(2-Chloroethoxy)Methane	1500	U	430	U	1700	U	1800	U		
2,4-Dichlorophenol	1500	U	430	U	1700	U	1800	U		
1,2,4-Trichlorobenzene	1500	U	430	U	1700	U	1800	U		
Naphthalene	1500	U	430	U	1700	U	320	J		
4-Chloroaniline	1500	U	430	UJ	1700	UJ	1800	UJ		
Hexachlorobutadiene	1500	U	430	U	1700	U	1800	U		
4-Chloro-3-Methylphenol	1500	U	430	U	1700	U	1800	U		
2-Methylnaphthalene	1500	U	430	U	1700	U	250	J		
Hexachlorocyclopentadiene	1500	U	430	U	1700	U	1800	U		
2,4,6-Trichlorophenol	1500	U	430	U	1700	U	1800	U		
2,4,5-Trichlorophenol	3700	U	1100	U	4400	U	4600	U		
2-Chloronaphthalene	1500	U	430	U	1700	U	1800	U		
2-Nitroaniline	3700	U	1100	U	4400	U	4600	U		
Dimethylphthalate	1500	U	430	U	1700	U	1800	U		
Acenaphthylene	1500	U	430	U	1700	U	1800	U		
2,6-Dinitrotoluene	1500	U	430	U	1700	U	1800	U		
3-Nitroaniline	3700	U	1100	UJ	4400	UJ	4600	UJ		
Acenaphthene	350	J	430	U	1700	U	200	J		
2,4-Dinitrophenol	3700	U	1100	U	4400	U	4600	U		

Appendix B

Area 9 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/25/96		6/25/96		6/25/96		6/25/96		6/24/96	
Sample Number	SS9/10-104		SS9/10-102		SS9/10-101		SS9/10-103		SS9/10-105(S)	
Organic Traffic Report Number	EBGK7		EBGK4		EBGK5		EBGK6		EBGK8	
4-Nitrophenol	3700	U	1100	U	4400	U	4600	U		
Dibenzofuran	190	J	430	U	1700	U	1800	U		
2,4-Dinitrotoluene	1500	U	430	U	1700	U	1800	U		
Diethylphthalate	1500	U	430	U	1700	U	1800	U		
4-Chlorophenyl-phenylether	1500	U	430	U	1700	U	1800	U		
Fluorene	340	J	430	U	1700	U	190	J		
4-Nitroaniline	3700	U	1100	U	4400	U	4600	U		
4,6-Dinitro-2-Methylphenol	3700	U	1100	U	4400	U	4600	U		
N-Nitrosodiphenylamine (1)	1500	U	430	U	1700	U	1800	U		
4-Bromophenyl-phenylether	1500	U	430	U	1700	U	1800	U		
Hexachlorobenzene	1500	U	430	U	1700	U	1800	U		
Pentachlorophenol	3700	UJ	1100	U	4400	U	4600	U		
Phenanthrene	3600	J	400	J	2100	J	2600	J		
Anthracene	640	J	55	J	190	J	540	J		
Carbazole	530	J	59	J	250	J	340	J		
Di-n-Butylphthalate	1600	J	430	U	1700	U	1200	J		
Fluoranthene	4800	J	650		4400	J	4200	J		
Pyrene	4200	J	580		3400	J	3500	J		
Butylbenzylphthalate	1500	U	60	J	1700	U	660	J		
3,3'-Dichlorobenzidine	1500	UJ	430	UJ	1700	UJ	1800	UJ		
Benzo(a)anthracene	2300	J	330	J	1400	J	1900	J		
Chrysene	2100	J	310	J	1800	J	1900	J		
bis(2-Ethylhexyl)Phthalate	3900	J	130	J	460	J	7400	J		
Di-n-Octyl Phthalate	1500	U	430	U	1700	U	1800	U		
Benzo (b) Fluoranthene	2800	J	420	J	2700	J	2800	J		
Benzo (k) Fluoranthene	740	J	220	J	790	J	890	J		
Benzo (a) Pyrene	1700	J	260	J	1600	J	1700	J		
Ideno (1,2,3-cd) Pyrene	1200	J	230	J	1000	J	1300	J		
Dibenzo (a,h) Anthracene	1500	U	430	U	1700	U	1800	U		
Benzo (g,h,i) Perylene	1300	J	270	J	1100	J	1400	J		

Appendix B

Area 9 - Surface

Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled Sample Number Organic Traffic Report Number	6/25/96 SS9/10-104 EBGK7		6/25/96 SS9/10-102 EBGK4		6/25/96 SS9/10-101 EBGK5		6/25/96 SS9/10-103 EBGK6		6/24/96 SS9/10-105(S) EBGK8	
<u>Pesticides & PCBs (ug/Kg)</u>										
alpha-BHC	1.9	U	2.2	U	1.8	U	1.9	U		
beta-BHC	1.9	U	2.2	U	1.8	U	1.9	U		
delta-BHC	1.9	U	2.2	U	1.8	U	1.9	U		
gamma-BHC (Lindane)	1.9	U	2.2	U	1.8	U	1.9	U		
Heptachlor	1.9	U	2.2	U	1.8	U	1.9	U		
Aldrin	1.9	U	2.2	U	1.8	U	1.9	U		
Heptachlor epoxide	1.9	U	2.5		1.8	U	1.9	U		
Endosulfan I	1.9	U	2.2	U	1.8	U	1.9	U		
Dieldrin	4.1	PJ	54	P	3.4	U	3.6	U		
4,4'-DDE	17	J	4.3	U	3.4	U	3.6	U		
Endrin	3.7	U	4.3	U	3.4	U	3.6	U		
Endosulfan II	3.7	U	4.3	U	3.4	U	3.6	U		
4,4'-DDD	7.1	J	4.3	U	3.4	U	3.6	U		
Endosulfan sulfate	3.7	U	4.3	U	3.4	U	3.6	U		
4,4'-DDT	41	J	4.3	U	3.4	U	7	J		
Methoxychlor	19	U	22	U	18	U	19	U		
Endrin ketone	3.7	U	4.3	U	3.4	U	3.6	U		
Endrin aldehyde	3.7	U	4.3	U	3.4	U	3.6	U		
alpha-Chlordane	1.9	U	2.2	U	1.8	U	1.9	U		
gamma-Chlordane	2	PJ	2.2	U	1.8	U	1.9	U		
Toxaphene	190	U	220	U	180	U	190	U		
Aroclor-1016	37	U	43	U	34	U	36	U		
Aroclor-1221	74	U	87	U	70	U	73	U		
Aroclor-1232	37	U	43	U	34	U	36	U		
Aroclor-1242	37	U	43	U	34	U	36	U		
Aroclor-1248	37	U	43	U	34	U	36	U		
Aroclor-1254	30	J	43	U	34	U	36	U		
Aroclor-1260	37	U	43	U	34	U	36	U		

Appendix B

Area 11 - Surface
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/11/96	6/11/96	6/11/96	6/11/96	6/11/96	6/24/96	6/24/96
Sample Number	SS11-204	SS11-205	SS11-201	SS11-202	SS11-203	SS11-207	SS11-206
Organic Traffic Report Number	EBFZ9	EBGA0	EBFZ6	EBFZ7	EBFZ8	EBGK3	EBGK2
<u>Volatile Organics (ug/Kg)</u>							
No Hits							
<u>Semivolatile Organics (ug/Kg)</u>							
Naphthalene	42					15000	
2-Methylnaphthalene	45						
Acenaphthene	70					39000	
Dibenzofuran	57					33000	
Fluorene	130					47000	
Phenanthrene	820	83	54	88	120	370000	4300
Anthracene	160					93000	
Carbazole	65					67000	
Di-n-Butylphthalate	190	110	160		94		5200
Fluoranthene	1300	160	110	160	280	440000	8700
Pyrene	280				57	430000	7600
Butylbenzylphthalate				44			
Benzo(a)anthracene	770	79	69	85	140	200000	3200
Chrysene	570	79	52	75	140	240000	3800
bis(2-Ethylhexyl)Phthalate	3100	880	2600	24000	11000	40000	37000
Di-n-Octyl Phthalate				100	66		
Benzo (b) Fluoranthene	680	86	99	87	240	220000	3500
Benzo (k) Fluoranthene	380	50	100	46	270	130000	2400
Benzo (a) Pyrene	96					150000	2400
Ideno (1,2,3-cd) Pyrene	63					120000	2100
Dibenzo (a,h) Anthracene	70						
Benzo (g,h,i) Perylene						120000	2000
<u>Pesticides & PCBs (ug/Kg)</u>							
delta-BHC		0.38			0.24		
Heptachlor						13	
Aldrin					0.69		2.3
Heptachlor epoxide	0.54					24	
Endosulfan I	0.64						
Dieldrin	6.6	0.31	0.11	0.21	0.67		10
4,4'-DDE	3.5		0.79				
Endrin		0.68			1.2		
Endosulfan II	3.2		0.36				
4,4'-DDD	2.1			0.34		12	
4,4'-DDT					0.94		
Methoxychlor	30	4.6	6.5	9.4	7.7		
Endrin ketone	1.1					11	
Endrin aldehyde	0.82			0.47		9.7	
alpha-Chlordane	2.9	0.5	0.35	0.36	0.54	120	
gamma-Chlordane						180	3
Aroclor-1254	530		57	31	31		
Aroclor-1260						350	450

Appendix B

Area 4 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/28/93	6/28/93	6/29/93	6/29/93	6/29/93	6/29/93	6/29/93	6/29/93	6/29/93	6/12/96	6/12/96	6/12/96	6/27/96	6/12/96
Sample Number	SB4-1D	SB4-1F	SB4-2D	SB4-3E	SB4-3E(D)	SB4-4E	SB4-5E	SB4-5F	SB4-5F	SB4-105(S)	SB4-102(S)	SB4-102(D)	SB4-201-16	SB4-104(S)
Organic Traffic Report Number	EXR35	EXR36	EXR38	EXR39	EXR40	EXR41	EXR42	EXR43	EXR43	EBGB0	EBGA3	EBGA4	EBGP1	EBGA7
<u>Volatile Organics (ug/Kg)</u>	CA	CA	CA	CA	CA	CA	CA	CA	CA					
Methylene Chloride													4	
Acetone			5	7	6		9							
1,1,1-Trichloroethane		360000	5				9	6	190000				2	
Benzene				2										
Tetrachloroethene				1										
Toluene				41	26	2		12						
Chlorobenzene				2	2	2								
<u>Semivolatile Organics (ug/Kg)</u>														
Naphthalene		3000							470					
2-Methylnaphthalene		1600												
Phenanthrene		580												
bis(2-Ethylhexyl)Phthalate	260		53				150	23						
<u>Pesticides & PCBs (ug/Kg)</u>														
alpha-BHC		2.8							4					
beta-BHC		5.9												
delta-BHC		1.8												
gamma-BHC (Lindane)	0.14	1.6												
Heptachlor		1.6							5.2					
Aldrin		2.3												
Endosulfan I		5.7							5.6					
4,4'-DDE				0.34		0.31	0.21							
Endosulfan II	0.2	0.18					0.17		0.44					
4,4'-DDD														
4,4'-DDT									0.59					
Methoxychlor		3.7												
Endrin aldehyde		0.78							1.5					

Appendix B

Area 4 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/12/96	6/12/96	6/12/96	6/12/96	6/27/96	6/12/96	6/12/96	6/12/96	6/12/96	6/12/96	6/13/96	6/12/96	6/12/96
Sample Number	SB4-104(S)-D	SB4-106(S)	SB4-107(S)	SB4-107(D)	SB4-202-8	SB4-104(D)	SB4-103(S)	SB4-101(S)	SB4-105(D)	SB4-106(D)	SB4-101(D)	SB4-103(D)	
Organic Traffic Report Number	EBGA8	EBGB2	EBGB4	EBGB5	EBGR3	EBGA9	EBGA5	EBGA1	EBGB1	EBGB3	EBGA2	EBGA6	
<u>Volatile Organics (ug/Kg)</u>													
Methylene Chloride													
Acetone													
1,1,1-Trichloroethane					510000								
Benzene													
Tetrachloroethene													
Toluene													
Chlorobenzene													
<u>Semivolatile Organics (ug/Kg)</u>													
Naphthalene													
2-Methylnaphthalene													
Phenanthrene													
bis(2-Ethylhexyl)Phthalate													
<u>Pesticides & PCBs (ug/Kg)</u>													
alpha-BHC													
beta-BHC													
delta-BHC													
gamma-BHC (Lindane)													
Heptachlor													
Aldrin													
Endosulfan I													
4,4'-DDE													
Endosulfan II													
4,4'-DDD													
4,4'-DDT													
Methoxychlor													
Endrin aldehyde													

Appendix B

Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/21/93	6/21/93	6/21/93	6/21/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93
Sample Number	SB7-1E	SB7-1F	SB7-2F	SB7-2D	SB7-3F	SB7-3G	SB7-4E	SB7-4H	SB7-5B	SB7-5E	SB7-5E(D)	SB7-6F	SB7-6H
Organic Traffic Report Number	EXR04	EXR05	EXR06	EXR07	EXR08	EXR09	EXR10	EXR11	EXR12	EXR13	EXR14	EXR15	EXR16
<i>Volatile Organics (ug/Kg)</i>	CA	CA	CA										
Methylene Chloride													
Acetone	8	22						18	10			25	10
1,1-Dichloroethene													
1,1-Dichloroethane	23	2	13	13	10	29		18			240		
1,2-Dichloroethene (total)	170	99	12	130	39	56	700	130	5	1700	8800	64	9
Chloroform													
1,2-Dichloroethane			29					2					
2-Butanone													
1,1,1-Trichloroethane	79	22	57	110	62	55	6500	220	11	5300	26000	35	14
Trichloroethene	2		8		11	7	2400	66	3	630	3000	2	
1,1,2-Trichloroethane													
Benzene													
4-Methyl-2-Pentanone			3					11					
Tetrachloroethene	6	2	3	5	27	10	17000	95	29	8400	24000	32	14
Toluene	1		13	13	2	9	2000	77	23	320	1000	8	2
Chlorobenzene													
Ethylbenzene				6			990	9	2	520	1300	13	
Styrene													
Xylene			2	32			6200	49	11	3400	8900	88	11
<i>Semivolatile Organics (ug/Kg)</i>													
4-Methylphenol	31												
Isophorone													
Naphthalene												160	61
2-Methylnaphthalene												55	53
2,4-Dinitrotoluene													
Diethylphthalate	27					31		45	33			29	29
Fluorene													
Phenanthrene							43	35					

Appendix B

Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/21/93	6/21/93	6/21/93	6/21/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93
Sample Number	SB7-1E	SB7-1F	SB7-2F	SB7-2D	SB7-3F	SB7-3G	SB7-4E	SB7-4H	SB7-5B	SB7-5E	SB7-5E(D)	SB7-6F	SB7-6H
Organic Traffic Report Number	EXR04	EXR05	EXR06	EXR07	EXR08	EXR09	EXR10	EXR11	EXR12	EXR13	EXR14	EXR15	EXR16
Anthracene							43						
Di-n-Butylphthalate	34	30	33	28	31	67	79	87	49	650	790	79	100
Fluoranthene								22					
Pyrene								24					
bis(2-Ethylhexyl)Phthalate	100	100	65	45	170	46	350	330	110		630	110	85
Di-n-Octyl Phthalate					23								
<u>Pesticides & PCBs (ug/Kg)</u>													
alpha-BHC													
gamma-BHC (Lindane)													
Heptachlor													
Aldrin													
Heptachlor epoxide													
Dieldrin													
4,4'-DDE													
Endosulfan II													
4,4'-DDD													
Endosulfan sulfate													
4,4'-DDT													
Methoxychlor													
Endrin aldehyde													
alpha-Chlordane													
gamma-Chlordane													
Aroclor-1232													
Aroclor-1242										170	140	37	21
Aroclor-1254												13	7.8
Aroclor-1260	58												

Appendix B

Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/23/93	6/23/93	6/23/93	6/23/93	6/23/93	6/23/93	6/23/93	6/24/93	6/24/93	6/24/93	6/24/93	6/24/93	6/29/93
Sample Number	SB7-7I	SB7-7F	SB7-8D	SB7-8I	SB7-9E	SB7-9J	SB7-10A	SB7-11D	SB7-12D	SB7-12D(D	SB7-13E	SB7-13E(D	SB7-14C
Organic Traffic Report Number	EXR-17	EXR18	EXR19	EXR20	EXR21	EXR22	EXR23	EXR25	EXR26	EXR27	EXR28	EXR29	EXR44
<i>Volatile Organics (ug/Kg)</i>	CA	CA	CA	CA									
Methylene Chloride													
Acetone	140							23	9	18			
1,1-Dichloroethene								7					
1,1-Dichloroethane	18												
1,2-Dichloroethene (total)	260	970	15000		7200	4	49000	240	1	2		11	35
Chloroform													
1,2-Dichloroethane													
2-Butanone													
1,1,1-Trichloroethane	530	25000	380000	190	66000	5	110000	100	21	32		130	8
Trichloroethene	340	10000	130000	150	58000	6	5500	8	3	4		8	
1,1,2-Trichloroethane													
Benzene													
4-Methyl-2-Pentanone													
Tetrachloroethene	920	24000	260000	1200	100000	7	16000	5	12	9	2	35	49
Toluene	140	2100	23000		12000	1	23000	4	1	2	4	2	19
Chlorobenzene													
Ethylbenzene	120	2900	31000	200	14000		26000	1					
Styrene							1600						
Xylene	930	18000	180000	1200	100000	6	210000	5					
<i>Semivolatile Organics (ug/Kg)</i>													
4-Methylphenol													
Isophorone													
Naphthalene	55	3800	11000		13000	31	15000						
2-Methylnaphthalene	35	2500	7300		5700		10000						
2,4-Dinitrotoluene							1500						
Diethylphthalate	41	1800				21		32	30	26	64		
Fluorene													
Phenanthrene													

Appendix B

Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/23/93	6/23/93	6/23/93	6/23/93	6/23/93	6/23/93	6/23/93	6/24/93	6/24/93	6/24/93	6/24/93	6/24/93	6/29/93
Sample Number	SB7-7I	SB7-7F	SB7-8D	SB7-8I	SB7-9E	SB7-9J	SB7-10A	SB7-11D	SB7-12D	SB7-12D(D	SB7-13E	SB7-13E(D	SB7-14C
Organic Traffic Report Number	EXR-17	EXR18	EXR19	EXR20	EXR21	EXR22	EXR23	EXR25	EXR26	EXR27	EXR28	EXR29	EXR44
Anthracene													
Di-n-Butylphthalate	84	1400	840		1700	40	2100	42	43	38	41	44	
Fluoranthene													
Pyrene													
bis(2-Ethylhexyl)Phthalate	57					44		90	91	110			76
Di-n-Octyl Phthalate									22	29			
<i>Pesticides & PCBs (ug/Kg)</i>													
alpha-BHC													
gamma-BHC (Lindane)													
Heptachlor													
Aldrin													
Heptachlor epoxide													
Dieldrin													
4,4'-DDE													0.35
Endosulfan II													
4,4'-DDD													
Endosulfan sulfate													
4,4'-DDT													
Methoxychlor													
Endrin aldehyde													
alpha-Chlordane													
gamma-Chlordane													
Aroclor-1232		250	490										
Aroclor-1242													
Aroclor-1254	8.9	410	1400		2500	5.6	480						
Aroclor-1260													

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Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/29/93	9/23/93	9/23/93	9/24/93	9/24/93	10/12/93	10/13/93	10/14/93	6/13/96	6/13/96	6/13/96	6/13/96
Sample Number	SB7-14D	SB7-15A	SB7-17A	SB7-24A	SB7-24B	SB7-19B	SB7-22D	SB7-23G	SB7-103(S)	SB7-106(D)	SB7-103(D)	SB7-104(S)
Organic Traffic Report Number	EXR45	EXS10	EXS11	EXS12	EXS13	EXT08	EXT09	EXT10	EBGC0	EBGC7	EBGC1	EBGC2
<u>Volatile Organics (ug/Kg)</u>	CA	CA	CA	CA	CA	CA	CA	CA				
Methylene Chloride					12							
Acetone		11	11	8400	27			8				
1,1-Dichloroethene			8		4							
1,1-Dichloroethane			12		190							
1,2-Dichloroethene (total)			61		9		10000		4			
Chloroform												
1,2-Dichloroethane			5		180							
2-Butanone	1500				13							
1,1,1-Trichloroethane	770		280	360000	51	2200	30000		1			
Trichloroethene			48	24000	21		960					
1,1,2-Trichloroethane												
Benzene												
4-Methyl-2-Pentanone					82							
Tetrachloroethene	24000		200	110000	22		8800	14				
Toluene					4	250	1500					
Chlorobenzene												
Ethylbenzene				15000		1700	4400					
Styrene												
Xylene	2300			110000	19	13000	19000					
<u>Semivolatile Organics (ug/Kg)</u>												
4-Methylphenol												
Isophorone					880							
Naphthalene	710			1000								
2-Methylnaphthalene				1100								
2,4-Dinitrotoluene												
Diethylphthalate												
Fluorene				130								
Phenanthrene				140								

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Area 7 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/29/93	9/23/93	9/23/93	9/24/93	9/24/93	10/12/93	10/13/93	10/14/93	6/13/96	6/13/96	6/13/96	6/13/96
Sample Number	SB7-14D	SB7-15A	SB7-17A	SB7-24A	SB7-24B	SB7-19B	SB7-22D	SB7-23G	SB7-103(S)	SB7-106(D)	SB7-103(D)	SB7-104(S)
Organic Traffic Report Number	EXR45	EXS10	EXS11	EXS12	EXS13	EXT08	EXT09	EXT10	EBGC0	EBGC7	EBGC1	EBGC2
Anthracene												
Di-n-Butylphthalate												
Fluoranthene												
Pyrene												
bis(2-Ethylhexyl)Phthalate		120	130	1200	240							
Di-n-Octyl Phthalate												
<i>Pesticides & PCBs (ug/Kg)</i>												
alpha-BHC	0.28											
gamma-BHC (Lindane)	0.68											
Heptachlor	0.13											
Aldrin	15											
Heptachlor epoxide	2.8			3.3								
Dieldrin	2.1											
4,4'-DDE	12											
Endosulfan II	6.2											
4,4'-DDD	1											
Endosulfan sulfate	0.33											
4,4'-DDT	4											
Methoxychlor	4.4				33							
Endrin aldehyde	1.7											
alpha-Chlordane	9.8											
gamma-Chlordane	1.3											
Aroclor-1232												
Aroclor-1242												
Aroclor-1254	430											
Aroclor-1260												

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Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/13/96	6/13/96	6/13/96	6/13/96	6/13/96	6/13/96	6/14/96	6/21/96	6/21/96	6/14/96
Sample Number	SB7-104(D)	SB7-105(S)	SB7-105(D)	SB7-106(S)	SB7-107(S)	SB7-107(D)	SB7-108(D)	SB7-109(S)	SB7-109(D)	SB7-108(S)
Organic Traffic Report Number	EBGC3	EBGC4	EBGC5	EBGC6	EBGC8	EBGC9	EBGD9	EBGH7	EBGH8	EBGD8
<u>Volatile Organics (ug/Kg)</u>										
Methylene Chloride										
Acetone										
1,1-Dichloroethene										
1,1-Dichloroethane										
1,2-Dichloroethene (total)						21				
Chloroform										
1,2-Dichloroethane										
2-Butanone										
1,1,1-Trichloroethane		2	1			40				
Trichloroethene										
1,1,2-Trichloroethane										
Benzene										
4-Methyl-2-Pentanone						9				
Tetrachloroethene		1			3					
Toluene						3				
Chlorobenzene										
Ethylbenzene						5				
Styrene										
Xylene						40				
<u>Semivolatile Organics (ug/Kg)</u>										
4-Methylphenol										
Isophorone										
Naphthalene										
2-Methylnaphthalene										
2,4-Dinitrotoluene										
Diethylphthalate										
Fluorene										
Phenanthrene										

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Area 7 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/13/96	6/13/96	6/13/96	6/13/96	6/13/96	6/13/96	6/14/96	6/21/96	6/21/96	6/14/96
Sample Number	SB7-104(D)	SB7-105(S)	SB7-105(D)	SB7-106(S)	SB7-107(S)	SB7-107(D)	SB7-108(D)	SB7-109(S)	SB7-109(D)	SB7-108(S)
Organic Traffic Report Number	EBGC3	EBGC4	EBGC5	EBGC6	EBGC8	EBGC9	EBGD9	EBGH7	EBGH8	EBGD8
Anthracene										
Di-n-Butylphthalate										
Fluoranthene										
Pyrene										
bis(2-Ethylhexyl)Phthalate										
Di-n-Octyl Phthalate										
<i>Pesticides & PCBs (ug/Kg)</i>										
alpha-BHC										
gamma-BHC (Lindane)										
Heptachlor										
Aldrin										
Heptachlor epoxide										
Dieldrin										
4,4'-DDE										
Endosulfan II										
4,4'-DDD										
Endosulfan sulfate										
4,4'-DDT										
Methoxychlor										
Endrin aldehyde										
alpha-Chlordane										
gamma-Chlordane										
Aroclor-1232										
Aroclor-1242										
Aroclor-1254										
Aroclor-1260										

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Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/13/96	6/13/96	6/13/96	6/13/96	6/25/96	6/25/96	6/26/96
Sample Number	SB7-101(S)	SB7-101(D)	SB7-102(S)	SB7-102(D)	SB7-201-1	SB7-202-6	SB7-202-6-D
Organic Traffic Report Number	EBGB6	EBGB7	EBGB8	EBGB9	EBGL9	EBGM0	EBGM1
<u>Volatile Organics (ug/Kg)</u>							
Methylene Chloride							
Acetone							
1,1-Dichloroethene					1300		
1,1-Dichloroethane					2900		
1,2-Dichloroethene (total)				7	47000		
Chloroform					570		
1,2-Dichloroethane							
2-Butanone							
1,1,1-Trichloroethane				2	460000	1100	1600
Trichloroethene					96000	240	
1,1,2-Trichloroethane					460		
Benzene					220		
4-Methyl-2-Pentanone							
Tetrachloroethene					23000	1100	2500
Toluene					23000	7500	14000
Chlorobenzene						1600	
Ethylbenzene					31000	13000	28000
Styrene							
Xylene					190000	57000	140000
<u>Semivolatile Organics (ug/Kg)</u>							
4-Methylphenol							
Isophorone							
Naphthalene							
2-Methylnaphthalene							
2,4-Dinitrotoluene							
Diethylphthalate							
Fluorene							
Phenanthrene							

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Area 7 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/13/96	6/13/96	6/13/96	6/13/96	6/25/96	6/25/96	6/26/96
Sample Number	SB7-101(S)	SB7-101(D)	SB7-102(S)	SB7-102(D)	SB7-201-1	SB7-202-6	SB7-202-6-D
Organic Traffic Report Number	EBGB6	EBGB7	EBGB8	EBGB9	EBGL9	EBGM0	EBGM1
Anthracene							
Di-n-Butylphthalate							
Fluoranthene							
Pyrene							
bis(2-Ethylhexyl)Phthalate							
Di-n-Octyl Phthalate							
<i>Pesticides & PCBs (ug/Kg)</i>							
alpha-BHC							
gamma-BHC (Lindane)							
Heptachlor							
Aldrin							
Heptachlor epoxide							
Dieldrin							
4,4'-DDE							
Endosulfan II							
4,4'-DDD							
Endosulfan sulfate							
4,4'-DDT							
Methoxychlor							
Endrin aldehyde							
alpha-Chlordane							
gamma-Chlordane							
Aroclor-1232							
Aroclor-1242							
Aroclor-1254							
Aroclor-1260							

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	7/13/93	7/13/93	6/24/96	7/1/96	7/2/96	6/24/96	6/24/96	6/24/96	6/24/96	6/24/96	6/24/96
Sample Number	SB9-1F	SB9-1FD	SB9/10-115(S)	SB9/10-202-1	SB9/10-203-2	SB9/10-110(S)	B9/10-110(D)	SB9/10-111(S)	B9/10-111(D)	SB9/10-112(S)	B9/10-112(D)
Organic Traffic Report Number	EXR56	EXR57	EBGK8	EBGR4	EBGR8	EBGJ4	EBGJ5	EBGJ6	EBGJ7	EBGJ8	EBGJ9
<u>Volatile Organics (ug/Kg)</u>											
Methylene Chloride											
Acetone											
1,1-Dichloroethene											
1,2-Dichloroethene (total)											
2-Butanone				5							
1,1,1-Trichloroethane					1						
Trichloroethene											
1,1,2-Trichloroethane											
Tetrachloroethene	5	5			8						
Toluene			11								
Xylene											1
<u>Semivolatile Organics (ug/Kg)</u>											
Naphthalene											
2-Methylnaphthalene											
Acenaphthene											
Dibenzofuran											
Fluorene											
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate											
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	7/13/93	7/13/93	6/24/96	7/1/96	7/2/96	6/24/96	6/24/96	6/24/96	6/24/96	6/24/96	6/24/96
Sample Number	SB9-1F	SB9-1FD	SB9/10-115(S)	SB9/10-202-1	SB9/10-203-2	SB9/10-110(S)	B9/10-110(D)	SB9/10-111(S)	B9/10-111(D)	SB9/10-112(S)	B9/10-112(D)
Organic Traffic Report Number	EXR56	EXR57	EBGK8	EBGR4	EBGR8	EBGJ4	EBGJ5	EBGJ6	EBGJ7	EBGJ8	EBGJ9
Pesticides & PCBs (ug/Kg)											
gamma-BHC (Lindane)											
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin											
4,4'-DDD											
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
Date Sampled	7/9/96		7/2/96								
Sample Number	SB9/10-205-5		SB9/10-203-22								
Organic Traffic Report Number	MEAPL5		MEAPL8								
Inorganics (mg/Kg)											
Aluminum	1180		957								
Antimony	0.69	U	3.8	BN							
Arsenic	0.67	B	0.81	B							
Barium	4.7	B	4.5	B							
Beryllium	0.06	B	0.09	U							
Cadmium	0.1	B	0.55	U							
Calcium	43500		42900								
Chromium	4.4		3.1								
Cobalt	1.3	B	1.2	B							
Copper	3.5	B	2.8	B							
Iron	3090		2600								
Lead	2		1.5								
Magnesium	18100		17100								
Manganese	89.3		79.6								
Mercury	0.06	U	0.05	U							
Nickel	3.5	B	3.6	B							
Potassium	215	B	146	B							
Selenium	0.48	U	0.18	U							
Silver	1	U	0.48	UN							
Sodium	65.2	B	113	B							
Thallium	0.65	B	0.16	B							
Vanadium	4.4	B	5.1	B							
Zinc	7.7		6.6								
Cyanide	0.04	U	0.17	B							

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/24/96	6/24/96	6/26/96	6/27/96	6/27/96	6/27/96	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96
Sample Number	SB9/10-113(S)	B9/10-113(D)	B9/10-131(D)	SB9/10-122(S)	B9/10-122(D)	SB9/10-132(S)	B9/10-118(D)	SB9/10-117(S)	B9/10-117(D)	SB9/10-116(S)	B9/10-116(D)
Organic Traffic Report Number	EBGK0	EBGK1	EBGP3	EBGP4	EBGP5	EBGP6	EBGM9	EBGN0	EBGN1	EBGN2	EBGN3
<i>Volatile Organics (ug/Kg)</i>											
Methylene Chloride			6	8			5	6	6	6	
Acetone											
1,1-Dichloroethene											
1,2-Dichloroethene (total)											
2-Butanone								10			
1,1,1-Trichloroethane											
Trichloroethene											
1,1,2-Trichloroethane											
Tetrachloroethene											
Toluene									2		
Xylene											
<i>Semivolatile Organics (ug/Kg)</i>											
Naphthalene											
2-Methylnaphthalene											
Acenaphthene											
Dibenzofuran											
Fluorene											
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate											
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/24/96	6/24/96	6/26/96	6/27/96	6/27/96	6/27/96	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96
Sample Number	SB9/10-113(S)	B9/10-113(D)	B9/10-131(D)	SB9/10-122(S)	B9/10-122(D)	SB9/10-132(S)	B9/10-118(D)	SB9/10-117(S)	B9/10-117(D)	SB9/10-116(S)	B9/10-116(D)
Organic Traffic Report Number	EBGK0	EBGK1	EBGP3	EBGP4	EBGP5	EBGP6	EBGM9	EBGN0	EBGN1	EBGN2	EBGN3
<i>Pesticides & PCBs (ug/Kg)</i>											
gamma-BHC (Lindane)					2.3						
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin											
4,4'-DDD				6.4							
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
<i>Inorganics (mg/Kg)</i>											
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96	6/25/96	6/25/96	6/25/96	6/25/96
Sample Number	SB9/10-130(S)	SB9/10-120(S)	B9/10-130(D)	B9/10-118(S)-	SB9/10-119(S)	B9/10-119(D)	B9/10-120(D)	SB9/10-129(S)	B9/10-129(D)	SB9/10-126(S)	B9/10-126(D)
Organic Traffic Report Number	EBGN4	EBGN5	EBGN6	EBGN7	EBGN8	EBGN9	EBGP0	EBGL5	EBGL6	EBGL7	EBGL8
Volatile Organics (ug/Kg)											
Methylene Chloride	5	5	5	6	5	5	6				
Acetone								6	4	2	6
1,1-Dichloroethene											
1,2-Dichloroethene (total)											
2-Butanone											
1,1,1-Trichloroethane											
Trichloroethene											
1,1,2-Trichloroethane											
Tetrachloroethene											
Toluene				1	2	4		5			6
Xylene											
Semivolatile Organics (ug/Kg)											
Naphthalene											
2-Methylnaphthalene											
Acenaphthene											
Dibenzofuran											
Fluorene											
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate											
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96	6/26/96	6/25/96	6/25/96	6/25/96	6/25/96
Sample Number	SB9/10-130(S)	SB9/10-120(S)	B9/10-130(D)	B9/10-118(S)-	SB9/10-119(S)	B9/10-119(D)	B9/10-120(D)	SB9/10-129(S)	B9/10-129(D)	SB9/10-126(S)	B9/10-126(D)
Organic Traffic Report Number	EBGN4	EBGN5	EBGN6	EBGN7	EBGN8	EBGN9	EBGP0	EBGL5	EBGL6	EBGL7	EBGL8
<i>Pesticides & PCBs (ug/Kg)</i>											
gamma-BHC (Lindane)											
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin											
4,4'-DDD											
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
Date Sampled											
Sample Number											
Organic Traffic Report Number											
<i>Inorganics (mg/Kg)</i>											
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

Appendix B

Area 9/10 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/25/96	6/25/96	6/25/96	6/25/96	6/26/96	6/26/96	6/26/96	6/24/96	6/24/96	6/24/96	6/25/96
Sample Number	SB9/10-114(S)	B9/10-114(D)	SB9/10-128(S)	B9/10-128(D)	SB9/10-121(S)	B9/10-121(D)	SB9/10-118(S)	SB9/10-115(S)	B9/10-115(S)-	B9/10-115(D)	SB9/10-127(S)
Organic Traffic Report Number	EBGM2	EBGM3	EBGM4	EBGM5	EBGM6	EBGM7	EBGM8	EBGK8	EBGK9	EBGL0	EBGL1
<i>Volatile Organics (ug/Kg)</i>											
Methylene Chloride											
Acetone	4	5									
1,1-Dichloroethene											
1,2-Dichloroethene (total)											
2-Butanone				5			4				
1,1,1-Trichloroethane											
Trichloroethene											
1,1,2-Trichloroethane											
Tetrachloroethene											
Toluene	1							11	13		3
Xylene											
<i>Semivolatile Organics (ug/Kg)</i>											
Naphthalene											
2-Methylnaphthalene											
Acenaphthene											
Dibenzofuran											
Fluorene											
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate											
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/25/96	6/25/96	6/25/96	6/25/96	6/26/96	6/26/96	6/26/96	6/24/96	6/24/96	6/24/96	6/25/96
Sample Number	SB9/10-114(S)	B9/10-114(D)	SB9/10-128(S)	B9/10-128(D)	SB9/10-121(S)	B9/10-121(D)	SB9/10-118(S)	SB9/10-115(S)	B9/10-115(S)-	B9/10-115(D)	SB9/10-127(S)
Organic Traffic Report Number	EBGM2	EBGM3	EBGM4	EBGM5	EBGM6	EBGM7	EBGM8	EBGK8	EBGK9	EBGL0	EBGL1
Pesticides & PCBs (ug/Kg)											
gamma-BHC (Lindane)											
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin											
4,4'-DDD											
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
Inorganics (mg/Kg)											
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/25/96	6/25/96	6/25/96	6/27/96	6/27/96	6/28/96	6/28/96	6/28/96	6/28/96	6/28/96	6/28/96
Sample Number	B9/10-127(D)	SB9/10-125(S)	B9/10-125(D)	SB9/10-139(S)	B9/10-140(D)	B9/10-142(D)	B9/10-141(D)	SB9/10-141(S)	B9/10-141(S)-	B9/10-124(D)	SB9/10-124(S)
Organic Traffic Report Number	EBGL2	EBGL3	EBGL4	EBGQ4	EBGQ5	EBGQ6	EBGQ7	EBGQ8	EBGQ9	EBGR0	EBGR1
<i>Volatile Organics (ug/Kg)</i>											
Methylene Chloride											
Acetone	3	2	9		5						
1,1-Dichloroethene											
1,2-Dichloroethene (total)											
2-Butanone											
1,1,1-Trichloroethane											
Trichloroethene											
1,1,2-Trichloroethane											
Tetrachloroethene											
Toluene	18	3	1								
Xylene											
<i>Semivolatile Organics (ug/Kg)</i>											
Naphthalene											
2-Methylnaphthalene											
Acenaphthene											
Dibenzofuran											
Fluorene											
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate											
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/25/96	6/25/96	6/25/96	6/27/96	6/27/96	6/28/96	6/28/96	6/28/96	6/28/96	6/28/96	6/28/96
Sample Number	B9/10-127(D)	SB9/10-125(S)	B9/10-125(D)	SB9/10-139(S)	B9/10-140(D)	B9/10-142(D)	B9/10-141(D)	SB9/10-141(S)	B9/10-141(S)-	B9/10-124(D)	B9/10-124(S)
Organic Traffic Report Number	EBGL2	EBGL3	EBGL4	EBGQ4	EBGQ5	EBGQ6	EBGQ7	EBGQ8	EBGQ9	EBGR0	EBGR1
<i>Pesticides & PCBs (ug/Kg)</i>											
gamma-BHC (Lindane)											
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin											
4,4'-DDD											
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
Date Sampled											
Sample Number											
Organic Traffic Report Number											
<i>Inorganics (mg/Kg)</i>											
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

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Area 9/10 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/28/96	7/9/96	7/9/96	7/10/96	7/10/96	7/10/96	7/10/96	7/10/96	7/10/96	6/20/96	6/20/96
Sample Number	SB9/10-20	SB9/10-205-	SB9/10-204-1	SB9/10-134(S)	B9/10-134(D)	SB9/10-135(S)	B9/10-135(D)	SB9/10-137(S)	B9/10-137(D)	B9/10-107(D)	SB9/10-107(S)
Organic Traffic Report Number	EBGR2	EBGS5	EBGS0	EBGS6	EBGS7	EBGS8	EBGS9	EBGT0	EBGT1	EBCG9	EBGH0
<i>Volatile Organics (ug/Kg)</i>											
Methylene Chloride		10	10	4	48	3	3	3	3		
Acetone		9	11								
1,1-Dichloroethene		2									
1,2-Dichloroethene (total)	5	86									
2-Butanone											
1,1,1-Trichloroethane	5	50					2				
Trichloroethene				1		1	2	2			
1,1,2-Trichloroethane		6									
Tetrachloroethene				20		7	46	2			
Toluene							3				
Xylene			4								
<i>Semivolatile Organics (ug/Kg)</i>											
Naphthalene											
2-Methylnaphthalene											
Acenaphthene											
Dibenzofuran											
Fluorene											
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate	70									44	78
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/20/96	6/20/96	6/20/96	6/20/96	6/19/96	6/29/96	6/29/96	6/19/96	6/20/96	6/20/96	6/27/96
Sample Number	B9/10-105(D)	SB9/10-105(S)	B9/10-101(D)	SB9/10-101(S)	B9/10-104(D)	SB9/10-104(S)	B9/10-103(D)	SB9/10-103(S)	SB9/10-109(S)	B9/10-109(D)	SB9/10-142(S)
Organic Traffic Report Number	EBGG8	EBGG7	EBGG4	EBGG3	EBGG2	EBGG1	EBGG0	EBGF9	EBGH1	EBGH2	EBGP8
<i>Volatile Organics (ug/Kg)</i>											
Methylene Chloride											
Acetone			8					8			
1,1-Dichloroethene											
1,2-Dichloroethene (total)											
2-Butanone											
1,1,1-Trichloroethane											
Trichloroethene											
1,1,2-Trichloroethane											
Tetrachloroethene											
Toluene											
Xylene											
<i>Semivolatile Organics (ug/Kg)</i>											
Naphthalene							420				
2-Methylnaphthalene							300				
Acenaphthene							220				
Dibenzofuran							150				
Fluorene							120				
Phenanthrene											
Anthracene											
Carbazole											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
Butylbenzylphthalate											
Benzo(a)anthracene											
Chrysene											
bis(2-Ethylhexyl)Phthalate											
Benzo (b) Fluoranthene											
Benzo (k) Fluoranthene											
Benzo (a) Pyrene											
Ideno (1,2,3-cd) Pyrene											
Benzo (g,h,i) Perylene											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/20/96	6/20/96	6/20/96	6/20/96	6/19/96	6/29/96	6/29/96	6/19/96	6/20/96	6/20/96	6/27/96
Sample Number	B9/10-105(D)	SB9/10-105(S)	B9/10-101(D)	SB9/10-101(S)	B9/10-104(D)	SB9/10-104(S)	B9/10-103(D)	SB9/10-103(S)	SB9/10-109(S)	B9/10-109(D)	SB9/10-142(S)
Organic Traffic Report Number	EBGG8	EBGG7	EBGG4	EBGG3	EBGG2	EBGG1	EBGG0	EBGF9	EBGH1	EBGH2	EBGP8
<i>Pesticides & PCBs (ug/Kg)</i>											
gamma-BHC (Lindane)											
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin						3.8					
4,4'-DDD											
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
Date Sampled											
Sample Number											
Organic Traffic Report Number											
<i>Inorganics (mg/Kg)</i>											
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

Appendix B

Area 9/10 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/21/96	6/21/96	6/21/96	6/21/96	6/27/96	6/27/96	6/27/96	6/27/96	6/27/96	6/27/96	6/27/96	6/20/96
Sample Number	SB9/10-108(S)	B9/10-108(D)	SB9/10-106(S)	B9/10-106(D)	SB9/10-123(S)	B9/10-123(D)	B9/10-139(D)	B9/10-123(S)-	B9/10-132(D)	SB9/10-140(S)	B9/10-102(D)	
Organic Traffic Report Number	EBGH3	EBGH4	EBGH5	EBGH6	EBGP9	EBGQ0	EBGQ1	EBGQ2	EBGQ3	EBGP7	EBGG6	
<i>Volatile Organics (ug/Kg)</i>												
Methylene Chloride												
Acetone												
1,1-Dichloroethene												
1,2-Dichloroethene (total)												
2-Butanone											4	
1,1,1-Trichloroethane												
Trichloroethene												
1,1,2-Trichloroethane												
Tetrachloroethene												
Toluene												
Xylene												
<i>Semivolatile Organics (ug/Kg)</i>												
Naphthalene												
2-Methylnaphthalene												
Acenaphthene												
Dibenzofuran												
Fluorene												
Phenanthrene												
Anthracene												
Carbazole												
Di-n-Butylphthalate												
Fluoranthene												
Pyrene												
Butylbenzylphthalate												
Benzo(a)anthracene												
Chrysene												
bis(2-Ethylhexyl)Phthalate	45		6900									
Benzo (b) Fluoranthene												
Benzo (k) Fluoranthene												
Benzo (a) Pyrene												
Ideno (1,2,3-cd) Pyrene												
Benzo (g,h,i) Perylene												

Appendix B

Area 9/10 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/21/96	6/21/96	6/21/96	6/21/96	6/27/96	6/27/96	6/27/96	6/27/96	6/27/96	6/27/96	6/20/96
Sample Number	SB9/10-108(S)	B9/10-108(D)	SB9/10-106(S)	B9/10-106(D)	SB9/10-123(S)	B9/10-123(D)	B9/10-139(D)	B9/10-123(S)-	B9/10-132(D)	SB9/10-140(S)	B9/10-102(D)
Organic Traffic Report Number	EBGH3	EBGH4	EBGH5	EBGH6	EBGP9	EBGQ0	EBGQ1	EBGQ2	EBGQ3	EBGP7	EBGG6
Pesticides & PCBs (ug/Kg)											
gamma-BHC (Lindane)											
Heptachlor epoxide											
Dieldrin											
4,4'-DDE											
Endrin											
4,4'-DDD											
4,4'-DDT											
gamma-Chlordane											
Aroclor-1254											
Inorganics (mg/Kg)											
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/20/96
Sample Number	SB9/10-102(S
Organic Traffic Report Number	EBGG5
<u>Volatile Organics (ug/Kg)</u>	
Methylene Chloride	
Acetone	
1,1-Dichloroethene	
1,2-Dichloroethene (total)	
2-Butanone	
1,1,1-Trichloroethane	
Trichloroethene	
1,1,2-Trichloroethane	
Tetrachloroethene	
Toluene	
Xylene	
<u>Semivolatile Organics (ug/Kg)</u>	
Naphthalene	
2-Methylnaphthalene	
Acenaphthene	
Dibenzofuran	
Fluorene	
Phenanthrene	
Anthracene	
Carbazole	
Di-n-Butylphthalate	
Fluoranthene	
Pyrene	
Butylbenzylphthalate	
Benzo(a)anthracene	
Chrysene	
bis(2-Ethylhexyl)Phthalate	
Benzo (b) Fluoranthene	
Benzo (k) Fluoranthene	
Benzo (a) Pyrene	
Ideno (1,2,3-cd) Pyrene	
Benzo (g,h,i) Perylene	

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Area 9/10 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/20/96
Sample Number	SB9/10-102(S
Organic Traffic Report Number	EBGG5
<i>Pesticides & PCBs (ug/Kg)</i>	
gamma-BHC (Lindane)	
Heptachlor epoxide	
Dieldrin	
4,4'-DDE	
Endrin	
4,4'-DDD	
4,4'-DDT	
gamma-Chlordane	
Aroclor-1254	
Date Sampled	
Sample Number	
Organic Traffic Report Number	
<i>Inorganics (mg/Kg)</i>	
Aluminum	
Antimony	
Arsenic	
Barium	
Beryllium	
Cadmium	
Calcium	
Chromium	
Cobalt	
Copper	
Iron	
Lead	
Magnesium	
Manganese	
Mercury	
Nickel	
Potassium	
Selenium	
Silver	
Sodium	
Thallium	
Vanadium	
Zinc	
Cyanide	

Appendix B

Area 11 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	8/25/93	8/25/93	8/25/93	8/25/93	8/26/93	8/26/93	8/26/93	8/27/93	8/27/93	8/30/93	8/30/93	8/30/93	8/31/93	8/31/93	8/31/93	9/1/93	9/1/93
Sample Number	SB11-1	SB11-1J	SB11-1J(D)	SB11-2	SB11-3	SB11-5	SB11-5K	SB11-4	SB11-4L	SB11-8	SB11-8	SB11-8(D)	SB11-6	SB11-6	SB11-9	SB11-7	SB11-7K
Organic Traffic Report Number	EXR76	EXR77	EXR78	EXR79	EXR80	EXR81	EXR82	EXR83	EXR84	EXR85	EXR86	EXR87	EXR88	EXR89	EXR90	EXR91	EXR92
<i>Volatile Organics (ug/Kg)</i>																	
Methylene Chloride		13	1			3			3	2200	2100	2900	24	30	53		
Acetone		44		9	8								7	6			
Carbon Disulfide														1	3		2
2-Butanone																	
1,1,1-Trichloroethane									2					3			
Trichloroethene																410	
Benzene									5								
Tetrachloroethene					46												
Toluene	930000	130		2	1	230000		290000	72	43000			9	2		150000	3
Ethylbenzene	56000	6			3	150000										64000	
Xylene	200000	21			8	530000	760	17000	15	2000						310000	8
<i>Semivolatile Organics (ug/Kg)</i>																	
2-Methylphenol	470							450	60	580		160	120				
4-Methylphenol	540							300		640			100				
Isophorone														100			
2-Nitrophenol																	
bis(2-Chloroethoxy)Methane																	230
Naphthalene	1400					150		80									1000
2-Methylnaphthalene	52					130		73									120
Phenanthrene							16	21								47	
Anthracene																45	
Di-n-Butylphthalate												510					
Fluoranthene																49	
Pyrene										63							
bis(2-Ethylhexyl)Phthalate	560					1300	1100			110							690
Di-n-Octyl Phthalate																250	260
<i>Pesticides & PCBs (ug/Kg)</i>																	
alpha-BHC	0.57							0.96	0.23								
gamma-BHC (Lindane)									0.18								
Aldrin								0.29									
4,4'-DDE	0.26			0.54	0.68												
Endosulfan II	0.34																
4,4'-DDD									0.29								
4,4'-DDT	0.56			0.3		0.43	0.45										
Endrin aldehyde									0.49								
alpha-Chlordane	0.18																

Appendix B

Area 11 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	9/1/93	9/1/93	7/3/96	6/29/96	6/30/96	6/30/96	6/17/96	6/17/96	6/17/96	6/17/96	6/17/96	6/17/96	6/17/96
Sample Number	SB11-10	SB11-10	B11-204-2	SB11-201-29	B11-203-1	SB11-202-9	SB11-105(S)	SB11-105(D)	SB11-106(S)	SB11-106(D)	SB11-107(S)	B11-107(S)-	B11-107(D)
Organic Traffic Report Number	EXR93	EXR94	EBGR9	EBGR5	EBGR6	EBGR7	EBGE0	EBGE1	EBGE2	EBGE3	EBGE4	EBGE5	EBGE6
<i>Volatile Organics (ug/Kg)</i>													
Methylene Chloride													
Acetone					5100			4		2	3		3
Carbon Disulfide		2		4									
2-Butanone				4									
1,1,1-Trichloroethane				4									
Trichloroethene													
Benzene	1500												
Tetrachloroethene													
Toluene	1400000	12			180000	180000							
Ethylbenzene	590000	2			20000	120000							
Xylene	2300000	23	2	1	110000	650000							
<i>Semivolatile Organics (ug/Kg)</i>													
2-Methylphenol		120											
4-Methylphenol		61											
2-Naphthol	1400												
4-Nitrophenol	1100												
Bis(2-Chloroethoxy)Methane													
1-Naphthalene	1900												
1-Methylnaphthalene	140												
Phenanthrene													
Anthracene													
Di-n-Butylphthalate													
Fluoranthene													
Pyrene													
Bis(2-Ethylhexyl)Phthalate	720												
Di-n-Octyl Phthalate		45											
<i>Pesticides & PCBs (ug/Kg)</i>													
alpha-BHC													
gamma-BHC (Lindane)													
Aldrin													
1,4'-DDE													
Endosulfan II													
1,4'-DDD													
1,4'-DDT													
Endrin aldehyde													
alpha-Chlordane													

Appendix B

Area 11 - Subsurface Below 10 feet
Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/17/96	6/17/96	6/17/96	6/17/96	6/17/96	6/17/96	6/18/96	6/18/96	6/18/96	6/18/96	6/18/96	6/18/96
Sample Number	SB11-109(S)	SB11-109(D)	SB11-110(S)	SB11-110(D)	SB11-108(S)	SB11-108(D)	SB11-111(S)	SB11-111(D)	SB11-112(S)	SB11-112(D)	SB11-113-(S)	SB11-113(D)
Organic Traffic Report Number	EBGE7	EBGE8	EBGE9	EBGF0	EBGF1	EBGF2	EBGF3	EBGF4	EBGF5	EBGF6	EBGF7	EBGF8
<i>Volatile Organics (ug/Kg)</i>												
Methylene Chloride												
Acetone				4	4	3						
Carbon Disulfide												
2-Butanone												
1,1,1-Trichloroethane												
Trichloroethene												
Benzene												
Tetrachloroethene									1	2		
Toluene												
Ethylbenzene												
Xylene												
<i>Semivolatile Organics (ug/Kg)</i>												
2-Methylphenol												
4-Methylphenol												
Isophorone												
2-Nitrophenol												
bis(2-Chloroethoxy)Methane												
Naphthalene												
2-Methylnaphthalene												
Phenanthrene												
Anthracene												
Di-n-Butylphthalate												
Fluoranthene												
Pyrene												
bis(2-Ethylhexyl)Phthalate												
Di-n-Octyl Phthalate												
<i>Pesticides & PCBs (ug/Kg)</i>												
alpha-BHC												
gamma-BHC (Lindane)												
Aldrin												
4,4'-DDE												
Endosulfan II												
4,4'-DDD												
4,4'-DDT												
Endrin aldehyde												
alpha-Chlordane												

Appendix B

Area 11 - Subsurface Below 10 feet
 Southeast Rockford - Source Control Operable Unit Risk Assessment

Date Sampled	6/20/96	6/20/96	6/14/96	6/14/96	6/14/96	6/14/96	6/14/96	6/14/96	6/14/96	6/14/96	6/14/96
Sample Number	SB9/10-102(D)	B9/10-102(S)	SB11-101(S)	SB11-101(D)	SB11-102(S)	SB11-102(D)	SB11-103(S)	SB11-103(D)	SB11-104(S)	SB11-104(D)	
Organic Traffic Report Number	EBGG6	EBGG5	EBGD0	EBGD1	EBGD2	EBGD3	EBGD4	EBGD5	EBGD6	EBGD7	
<i>Volatile Organics (ug/Kg)</i>											
Methylene Chloride											
Acetone											
Carbon Disulfide											
2-Butanone											
1,1,1-Trichloroethane											
Trichloroethene											
Benzene											
Tetrachloroethene											
Toluene											
Ethylbenzene											
Xylene											
<i>Semivolatile Organics (ug/Kg)</i>											
2-Methylphenol											
4-Methylphenol											
Isophorone											
2-Nitrophenol											
bis(2-Chloroethoxy)Methane											
Naphthalene											
2-Methylnaphthalene											
Phenanthrene											
Anthracene											
Di-n-Butylphthalate											
Fluoranthene											
Pyrene											
bis(2-Ethylhexyl)Phthalate											
Di-n-Octyl Phthalate											
<i>Pesticides & PCBs (ug/Kg)</i>											
alpha-BHC											
gamma-BHC (Lindane)											
Aldrin											
4,4'-DDE											
Endosulfan II											
4,4'-DDD											
4,4'-DDT											
Endrin aldehyde											
alpha-Chlordane											

APPENDIX C

BACKUP FOR CALCULATION OF 95% UCLS

Table C-1
Upper Confidence Limits for Area 4 Surface Soil

Analytes	Original UCL						Re-Calculated UCL				
	Minimum Concentrations	Maximum Concentrations	Mean (y)	Standard deviation (s _y)	H(1-a)	Lognormal Distribution UCL (95%)	Mean (y)	Standard deviation (s _y)	H _(1-a)	Lognormal Distribution UCL (95%)	Maximum Concentration
PAHs (ug/kg)											
Benzo(a)anthracene	53	5600	6.07	1.65	5.27	44220	5.08	0.671	3.553	663	330
Benzo(b)Fluoranthene	67	11000	6.33	2.04	6.41	623453	5.02	0.858	4.303	1380	640
Benzo(k)Fluoranthene	70	11000	6.30	2.10	6.60	932833	4.94	0.932	4.615	1851	670
Benzo(a)Pyrene	97	1100	5.51	0.88	3.19	1047	5.05	0.299	2.400	234	200

Notes:

Equation used for lognormal distribution¹:

$$UL_{(1-a)} = \text{Exp}(y + 0.5 \cdot (s_y)^2 + s_y \cdot H_{(1-a)} / (n-1)^{1/2})$$

Where:

a = confidence level

y = mean

s_y = standard deviation

H(1-a) = variable dependent on a, y, and s_y

1. Reference book used for equation is by Richard Gilbert, "Statistical Methods For Environmental Pollution Monitoring", 1987, p. 170.

- H value for anthracene based on a standard deviation of 1.0. The actual standard deviation for anthracene did not have an H value associated with it.
- Sample points SS4-201, SS4-203, and SS4-203D were removed from the re-calculated UCL as hot spots

Table C-2
 Detections for Area 9 Surface Soil

Analytes	SS910-104	SS910-102	SS910-101	SS910-103
PAHs (ug/kg)				
Benzo(a)anthracene	2300	330	1400	1900
Benzo(b)Fluoranthene	2800	420	2700	2800
Benzo(a)Pyrene	1700	260	1600	1700
Indeno(1,2,3-cd)pyrene	1200	230	1000	1300

Notes:

- * Not enough sample points to run UCL test
- ** All exceedances are bolded

Table C-3
Upper Confidence Limits for Area 11 Surface Soil

Analytes			Original UCL				Re-Calculated UCL				
	Minimum Concentrations	Maximum Concentrations	Mean (y)	Standard deviation (s _y)	H(1-a)	Lognormal Distribution UCL (95%)	Mean (y)	Standard deviation (s _y)	H _(1-a)	Lognormal Distribution Mean UCL (95%)	Maximum Concentration
PAHs (ug/kg)											
Benzo(a)anthracene	69	200000	6.42	2.93	9.70	4751532520	4.93	0.998	4.90	2613.2	770
Chrysene	52	240000	6.37	3.05	10.1	17963930946	4.79	0.942	4.66	1672.9	570
Benzo(b)Fluoranthene	86	220000	6.57	2.87	9.52	3054767046	5.10	0.900	4.48	1852.1	680
Benzo(k)Fluoranthene	46	130000	6.21	2.81	9.34	1161455752	4.78	0.962	4.74	1846.4	380

Notes:

Equation used for lognormal distribution¹:

$$UL_{(1-a)} = \text{Exp}(y + 0.5 \cdot (s_y)^2 + s_y \cdot H_{(1-a)} / (n-1)^{1/2})$$

Where:

a = confidence level

y = mean

s_y = standard deviation

H(1-a) = variable dependent on a, y, and s_y

1. Reference book used for equation is by Richard Gilbert, "Statistical Methods For Environmental Pollution Monitoring", 1987, p. 170.

* H value for anthracene based on a standard deviation of 1.0. The actual standard deviation for anthracene did not have an H value associated with it.

** Sample points SS11-206 and SS11-207 were removed from the re-calculated UCL as hot spots

APPENDIX D

CALCULATIONS OF BACKGROUND CONCENTRATIONS

TABLE D-1
SOUTHEAST ROCKFORD
CALCULATION OF LOGNORMAL DISTRIBUTION 95% UPPER CONFIDENCE INTERVAL FOR PAHS

Analytes	Minimum Concentrations	Maximum Concentrations	Mean (y)	Standard deviation (s _y)	H _(1-a)	Lognormal Distribution UCL (95%)
PAHs (ug/kg)						
Naphthalene	175	850	5.36	0.419	2.027567	296.5
2-Methylnaphthalene	175	850	5.36	0.419	2.027567	296.5
Acenaphthene	175	850	5.36	0.419	2.027567	296.5
Acenaphthylene	175	850	5.36	0.419	2.027567	296.5
Fluorene	175	850	5.36	0.419	2.027567	296.5
Phenanthrene	150	2100	5.42	0.676	2.34512	446.4
Anthracene	175	205	5.24	0.049	1.766333	194.5
Fluoranthene	44	4400	5.30	1.03	2.91268	808.8
Pyrene	45	3400	5.35	0.927	2.734143	670.0
Benzo(a)anthracene	53	1400	5.30	0.684	2.35608	401.1
Chrysene	72	1800	5.30	0.724	2.41392	431.2
Benzo(b)Fluoranthene	67	2700	5.31	0.84	2.591933	538.8
Benzo(k)Fluoranthene	70	790	5.20	0.557	2.187537	301.2
Benzo(a)Pyrene	140	1600	5.39	0.605	2.24785	389.0
Indeno(1,2,3-cd)Pyrene	175	1000	5.37	0.464	2.077067	316.7
Dibenzo(a,h)anthracene	175	850	5.36	0.419	2.027567	296.5
Benzo(g,h,i)Perylene	175	1100	5.38	0.49	2.105667	329.3

Notes:

Equation used for lognormal distribution¹:

$$UL_{(1-a)} = \text{Exp}(y + 0.5 \cdot (s_y)^2 + s_y \cdot H_{(1-a)} / (n-1)^{1/2})$$

Where:

a = confidence level

y = mean

s_y = standard deviation

H(1-a) = variable dependent on a, y, and s_y

1. Reference book used for equation is by Richard Gilbert, "Statistical Methods For Environmental Pollution Monitoring", 1987, p. 170.

* H value for anthracene based on a standard deviation of 1.0. The actual standard deviation for anthracene did not have an H value associated with it.

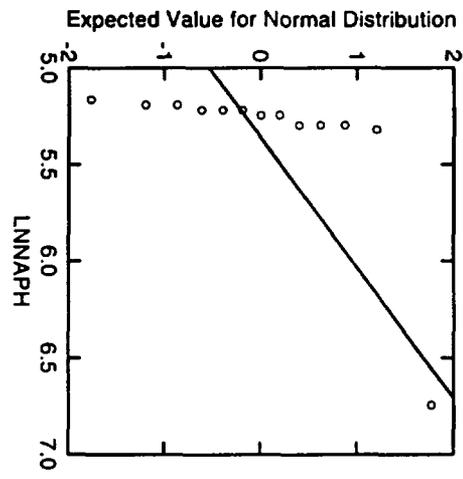
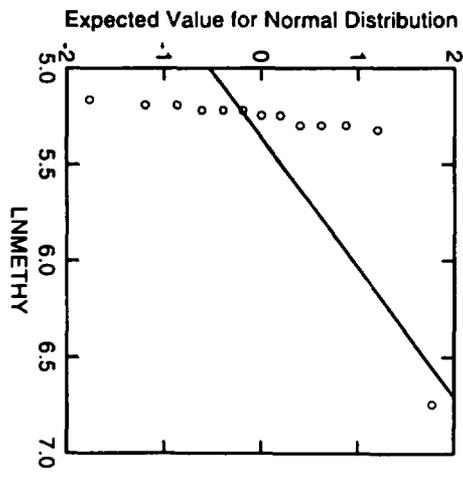
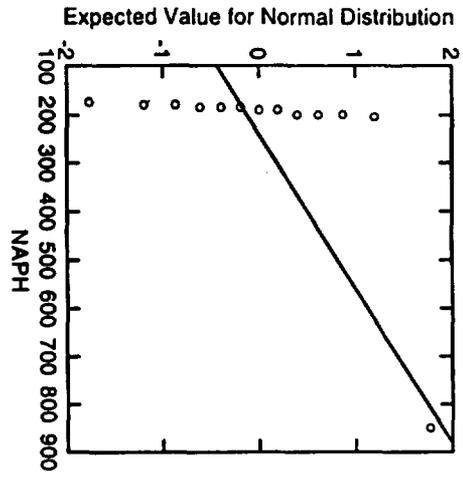
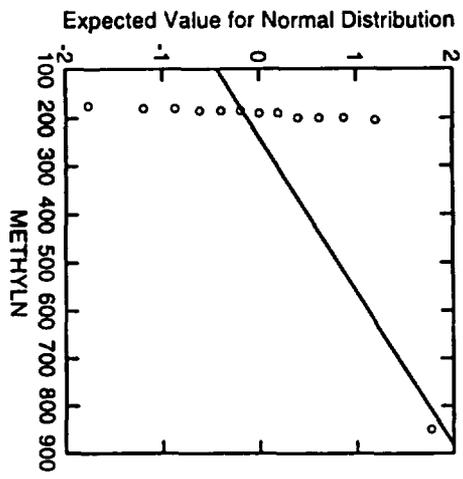
Table D-2
Background Surface Samples
Southeast Rockford - Source Control Operable Unit Risk Assessment

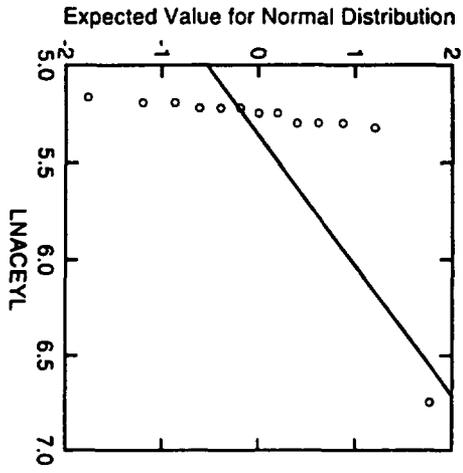
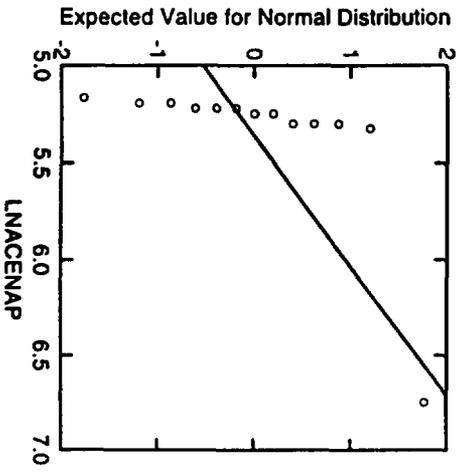
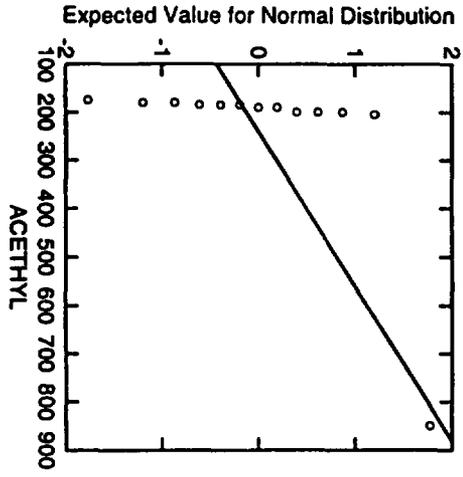
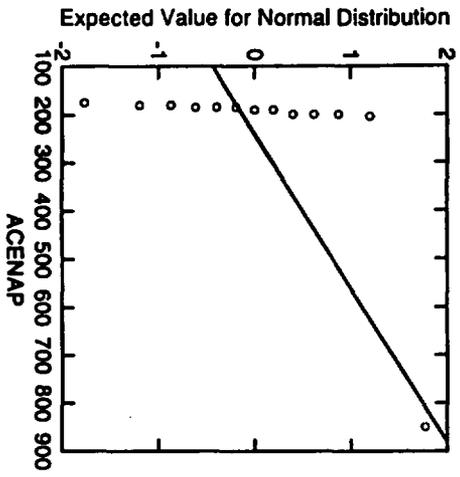
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	EXS01	DL	EXS02	DL	EXS03	DL	EBGK5	DL
<i>Semivolatile Organics (ug/kg)</i>								
Naphthalene	ND	370	ND	370	ND	360	ND	1700
2-Methylnaphthalene	ND	370	ND	370	ND	360	ND	1700
Acenaphthene	ND	370	ND	370	ND	360	ND	1700
Acenaphthylene	ND	370	ND	370	ND	360	ND	1700
Fluorene	ND	370	ND	370	ND	360	ND	1700
Phenanthrene	ND	370	ND	370	ND	360	2100	
Anthracene	ND	370	ND	370	ND	360	190	
Fluoranthene	ND	370	ND	370	ND	360	4400	
Pyrene	ND	370	ND	370	ND	360	3400	
Benzo(a)anthracene	ND	370	ND	370	ND	360	1400	
Chrysene	ND	370	ND	370	ND	360	1800	
Benzo (b) Fluoranthene	ND	370	ND	370	ND	360	2700	
Benzo (k) Fluoranthene	ND	370	ND	370	ND	360	790	
Benzo (a) Pyrene	ND	370	ND	370	ND	360	1600	
Indeno (1,2,3-cd) Pyrene	ND	370	ND	370	ND	360	1000	
Dibenzo (a,h) Anthracene	ND	370	ND	370	ND	360	ND	1700
Benzo (g,h,i) Perylene	ND	370	ND	370	ND	360	1100	

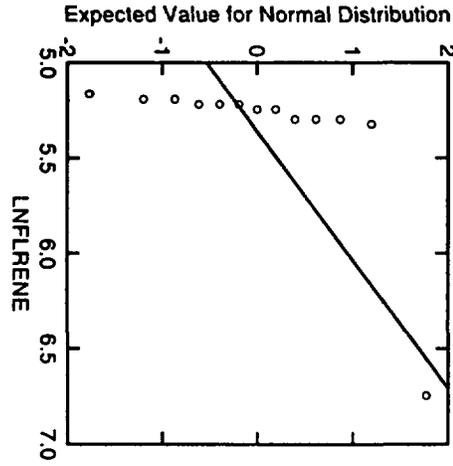
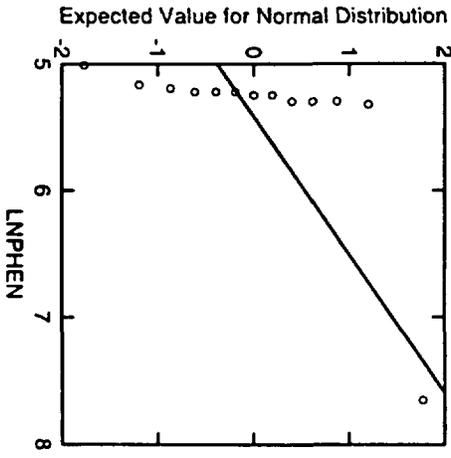
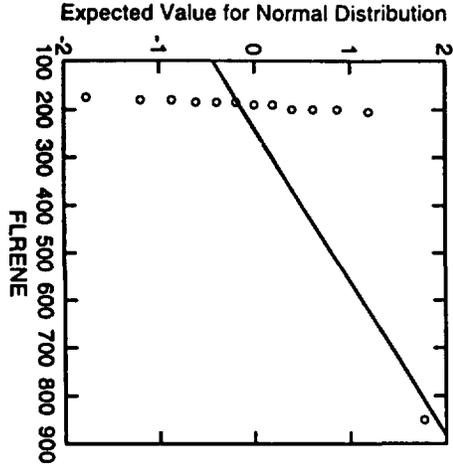
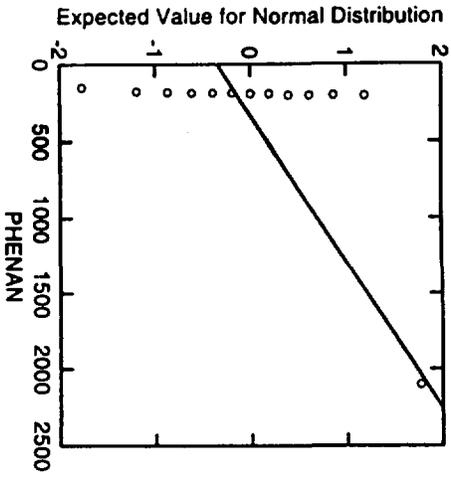
Table D-2
Background Surface Samples
Southeast Rockford - Source Control Operable Unit Risk Assessment

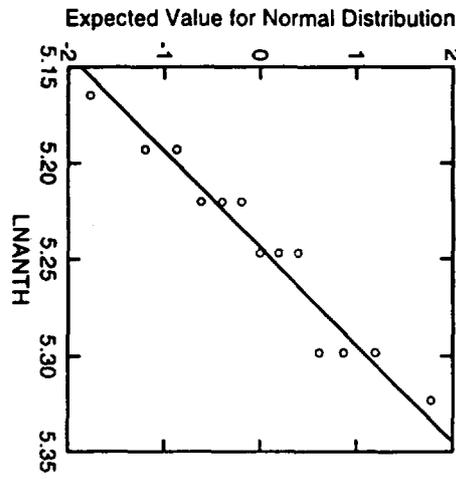
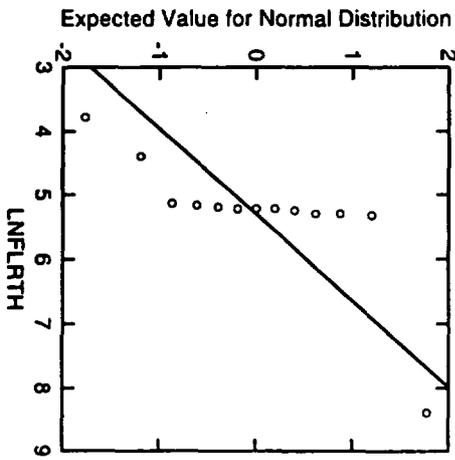
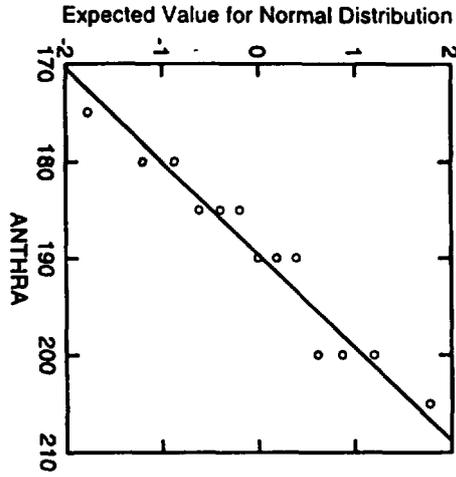
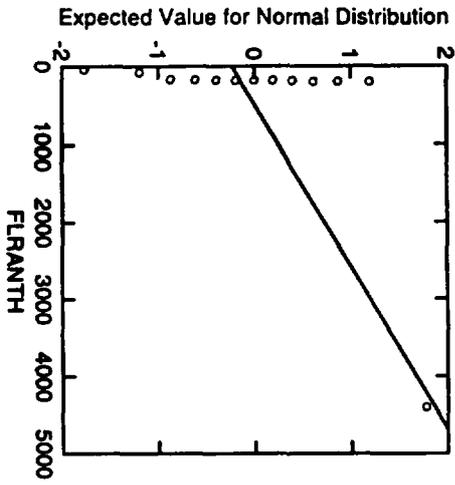
Date Sampled	9/22/93		6/10/96		6/10/96		6/21/96		6/21/96		6/21/96		6/21/96		6/21/96		9/22/93	
Sample Number	SS4-7		SS4-205		SS4-204		SS7-105		SS7-102		SS7-103		SS7-104		SS7-101		SS7-1	
Organic Traffic Report Number	EXS08	DL	EBFY5	DL	EBFY4	DL	EBGH9	DL	EBGJ0	DL	EBGJ1	DL	EBGJ2	DL	EBGJ3	DL	EXR99	DL
<i>Semivolatile Organics (ug/kg)</i>																		
Naphthalene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
2-Methylnaphthalene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Acenaphthene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Acenaphthylene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Fluorene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Phenanthrene	150		ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Anthracene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Fluoranthene	170		81		44		ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Pyrene	160		ND	400	45		ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Benzo(a)anthracene	ND	360	53		ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Chrysene	110		72		ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Benzo (b) Fluoranthene	110		150		67		ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Benzo (k) Fluoranthene	84		160		70		ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Benzo (a) Pyrene	140		ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Indeno (1,2,3-cd) Pyrene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Dibenzo (a,h) Anthracene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370
Benzo (g,h,i) Perylene	ND	360	ND	400	ND	380	ND	400	ND	400	ND	410	ND	380	ND	350	ND	370

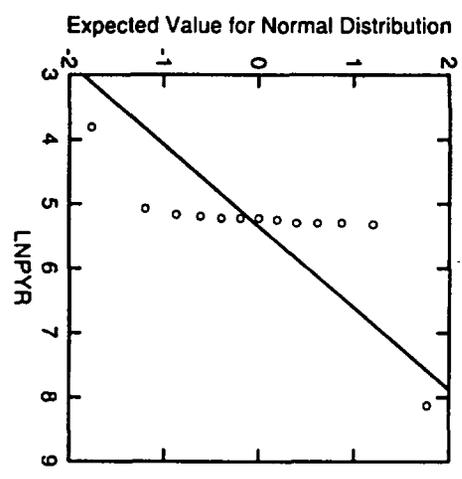
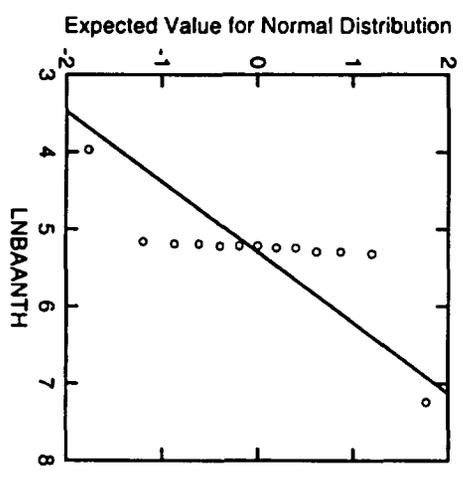
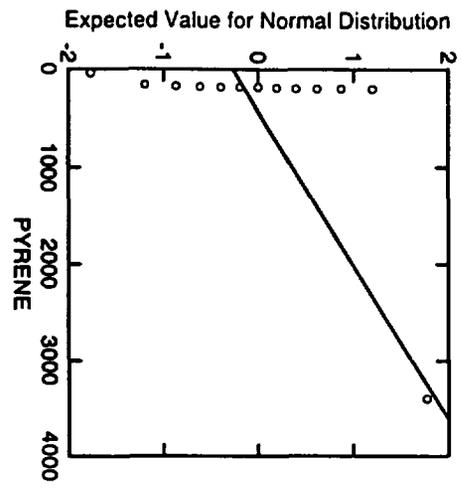
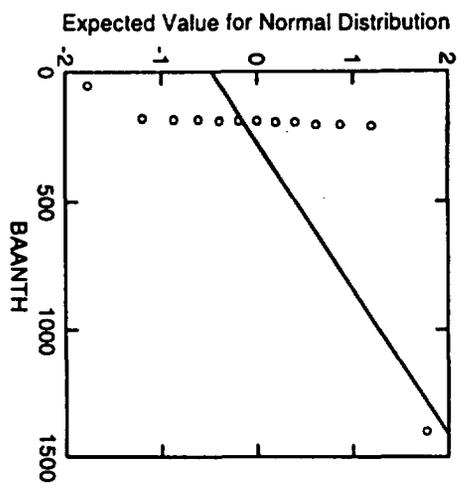
Variable	N-of-Cases	MaxDif	Lilliefors Probability (2-tail)
NAPH	13.000	0.500	0.0
LNNAPH	13.000	0.457	0.0
METHYLN	13.000	0.500	0.0
LN METHY	13.000	0.457	0.0
ACETHYL	13.000	0.500	0.0
LNACEYL	13.000	0.457	0.0
ACENAP	13.000	0.500	0.0
LNACENAP	13.000	0.457	0.0
FLRENE	13.000	0.500	0.0
LNFLRENE	13.000	0.457	0.0
PHENAN	13.000	0.519	0.0
LNPHEN	13.000	0.477	0.0
ANTHRA	13.000	0.177	0.336
LNANTH	13.000	0.176	0.343
FLRANTH	13.000	0.520	0.0
LNFLRTH	13.000	0.414	0.000
PYRENE	13.000	0.520	0.0
LN PYR	13.000	0.433	0.000
BAANTH	13.000	0.500	0.0
LNBAANTH	13.000	0.407	0.000
CHRYSENE	13.000	0.505	0.0
LNCHRY	13.000	0.411	0.000
BBFLUOR	13.000	0.513	0.0
LNBBFL	13.000	0.416	0.000
BKFLUOR	13.000	0.448	0.000
LN BKFL	13.000	0.336	0.000
BAPYR	13.000	0.514	0.0
LN BAPYR	13.000	0.466	0.0
INDENO	13.000	0.506	0.0
LNINDEN	13.000	0.465	0.0
DIBENZO	13.000	0.500	0.0
LNDIBEN	13.000	0.457	0.0
BGHIPER	13.000	0.509	0.0
LNBGHIP	13.000	0.469	0.0

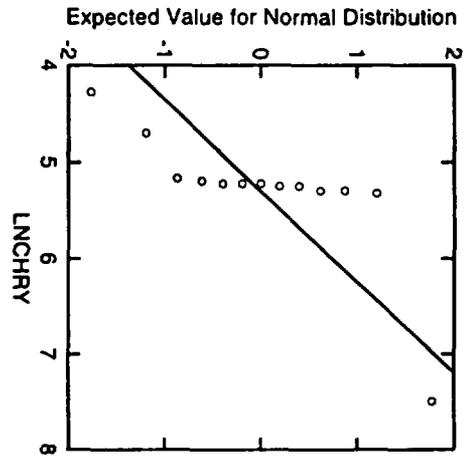
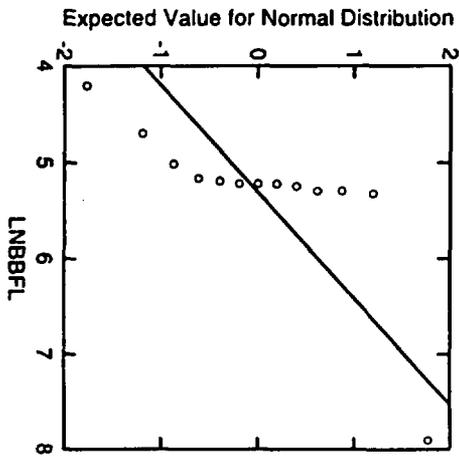
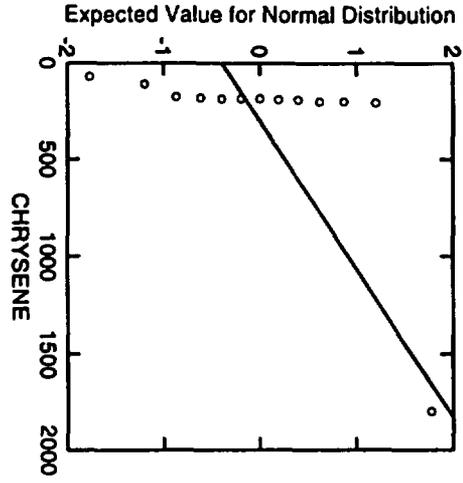
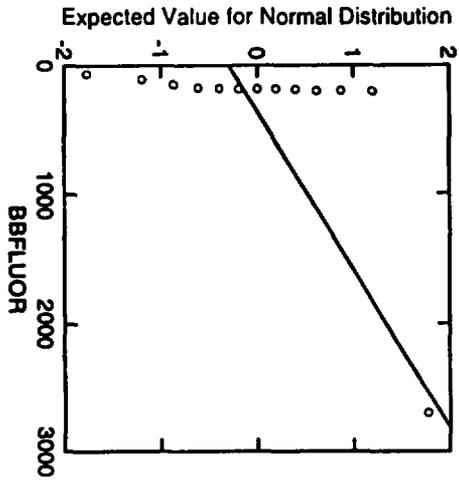


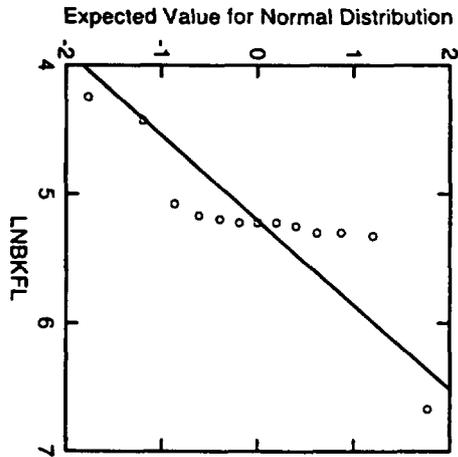
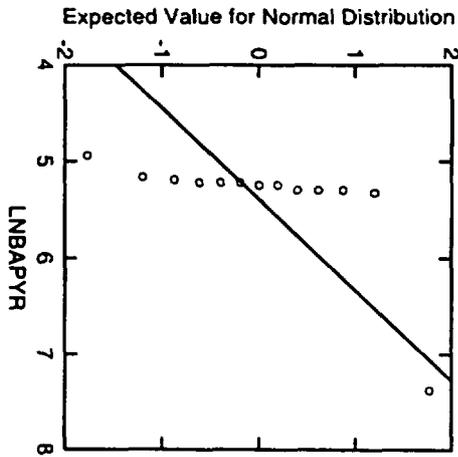
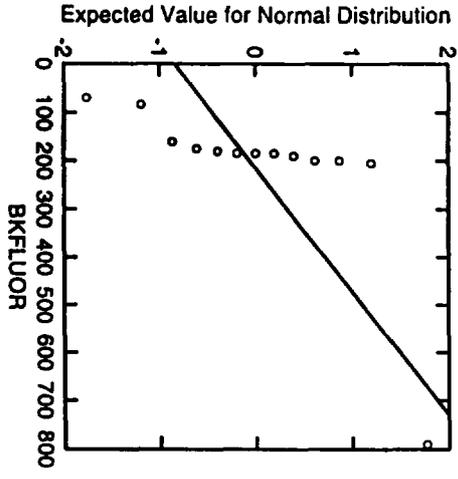
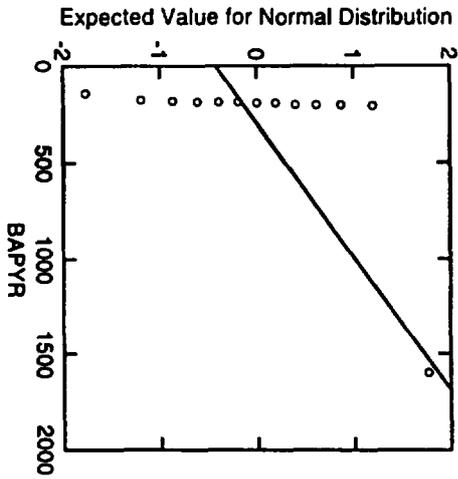


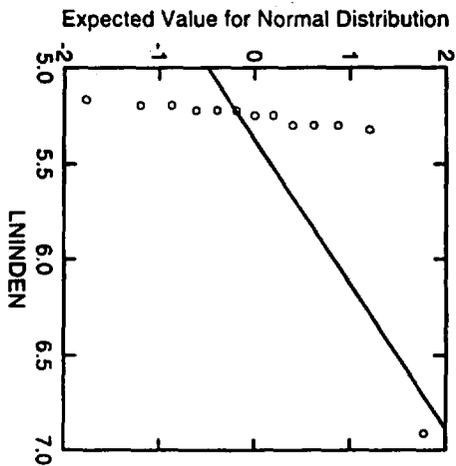
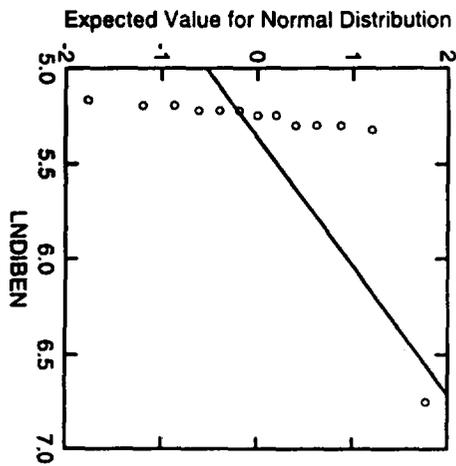
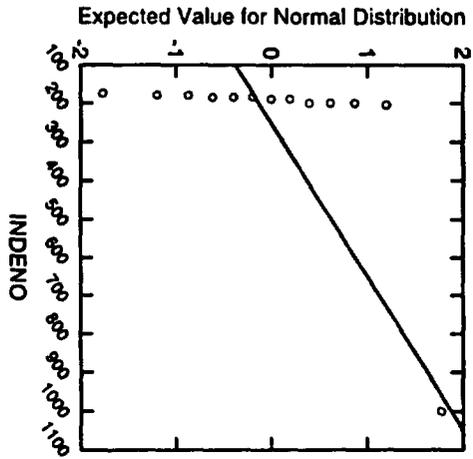
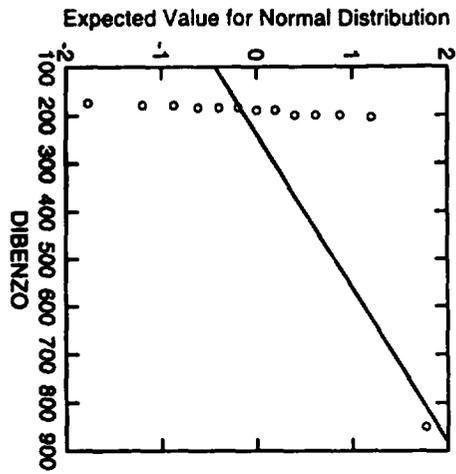


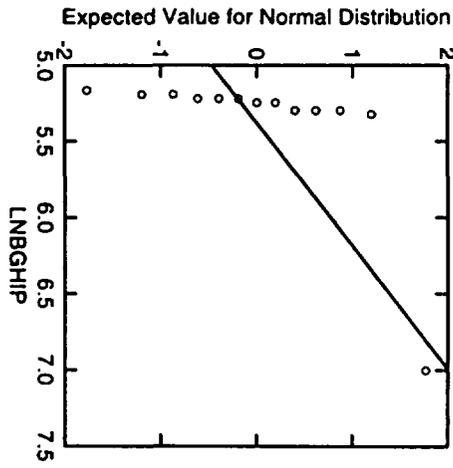
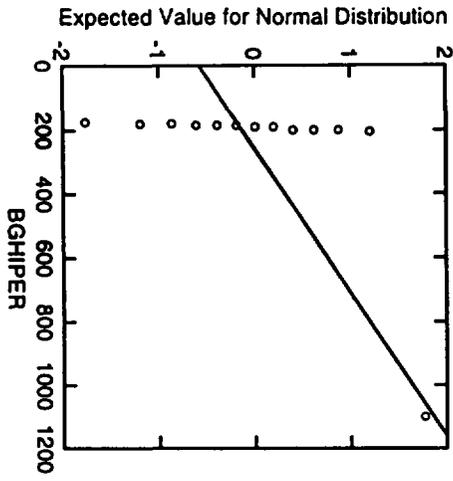












APPENDIX E

RBCA EQUATIONS

Appendix E - RBCA Equations

Equations for the Soil Component of the Groundwater	Remediation Objective (mg/kg)	$\frac{GW_{source}}{LF_{sw}}$ <p>NOTE: This equation can only be used to model contaminant migration not in the water bearing unit.</p>	R12
Ingestion Exposure Route	Groundwater at the source, GW_{source} (mg/L)	$GW_{source} = \frac{GW_{comp}}{C_{(x)}/C_{source}}$	R13
	Leaching Factor, LF_{sw} (mg/L _{water})/(mg/kg _{soil})	$LF_{sw} = \frac{\rho_s \cdot \frac{cm^3 \cdot kg}{L \cdot g}}{[\theta_{ws} + (k_s \cdot \rho_s) + (H' \cdot \theta_{as})] \cdot \left[1 + \frac{(U_{rw} \cdot \delta_{rw})}{(I \cdot W)} \right]}$	R14
	Steady-State Attenuation Along the Centerline of a Dissolved Plume, $C_{(x)}/C_{source}$	$C_{(x)}/C_{source} = \exp \left[\left(\frac{X}{2\alpha_x} \right) \left(1 - \sqrt{1 + \frac{4\lambda \cdot \alpha_x}{U}} \right) \right] \cdot \operatorname{erf} \left[\frac{S_w}{4 \cdot \sqrt{\alpha_y \cdot X}} \right] \cdot \operatorname{erf} \left[\frac{S_d}{2 \cdot \sqrt{\alpha_z \cdot X}} \right]$ <p>NOTE: 1. This equation does not predict the contaminant flow within bedrock. 2. If the value of the First Order Degradation Constant (λ) is not readily available, then set $\lambda = 0$.</p>	R15
	Longitudinal Dispersivity, α_x (cm)	$\alpha_x = 0.10 \cdot X$	R16

Transverse Dispersivity, α_y (cm)	$\alpha_y = \frac{\alpha_x}{3}$	R17
Vertical Dispersivity, α_z (cm)	$\alpha_z = \frac{\alpha_x}{20}$	R18
Specific Discharge, U (cm/d)	$U = \frac{K \cdot i}{\theta_T}$	R19
Soil-Water Sorption Coefficient, k_s	$k_s = K_{oc} \cdot f_{oc}$	R20
Volumetric Air Content in Vadose Zone Soils, θ_{av} ($\text{cm}^3_{\text{air}}/\text{cm}^3_{\text{soil}}$)	$\theta_{av} = \theta_T - \frac{(w \cdot \rho_s)}{\rho_w}$	R21
Volumetric Water Content in Vadose Zone Soils, θ_{wv} ($\text{cm}^3_{\text{water}}/\text{cm}^3_{\text{soil}}$)	$\theta_{wv} = \frac{w \cdot \rho_s}{\rho_w}$	R22
Total Soil Porosity, θ_T ($\text{cm}^3/\text{cm}^3_{\text{soil}}$)	$\theta_T = \theta_{av} + \theta_{wv}$	R23

*is hydraulic gradient
K = hydraulic conductivity*

	Groundwater Darcy Velocity, U_{gw} (cm/yr)	$U_{gw} = K \cdot i$	R24
Equations for the Groundwater Ingestion Exposure Route	Remediation Objective for Carcinogenic Contaminants (mg/L)	$\frac{TR \cdot BW \cdot AT_c \cdot 365 \frac{d}{yr}}{SF_o \cdot IR_w \cdot EF \cdot ED}$	R25
	Dissolved Hydrocarbon Concentration along Centerline, $C_{(x)}$ (g/cm ³ _{water})	$C_{(x)} = C_{source} \cdot \exp \left[\left(\frac{X}{2\alpha_x} \right) \cdot \left(1 - \sqrt{1 + \frac{4\lambda \cdot \alpha_x}{U}} \right) \right] \cdot \operatorname{erf} \left[\frac{S_w}{4 \cdot \sqrt{\alpha_y \cdot X}} \right] \cdot \operatorname{erf} \left[\frac{S_d}{2 \cdot \sqrt{\alpha_z \cdot X}} \right]$ <p>NOTE:</p> <ol style="list-style-type: none"> 1. This equation does not predict the contaminant flow within bedrock. 2. If the value of the First Order Degradation Constant (λ) is not readily available, then set $\lambda = 0$. 	R26